

No.

9800351



THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Frigene Advanced Genetics, Inc.

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED DISTINCT VARIETY OF SEXUALLY REPRODUCED, OR TUBER PROPAGATED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.
NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF TWENTY YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF Viable BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE PURPOSE, OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE PURPOSE, OR USING IT IN PRODUCING A HYBRID OR VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. (84 U.S.C. AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

LETTUCE

'Crusader'

In Testimony Whereof, I have hereunto set my hand
and caused the seal of the Plant Variety
Protection Office to be affixed at the City of
Washington, D.C. this eighth day of October, in
the year two thousand and four.

Attest:

Dr. M. J. John
Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

Arthur F. Heerman
Secretary of Agriculture

REPRODUCE LOCALLY. Include form number and date on all reproductions.

FORM APPROVED - OMB NO. 0581-00

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY DIVISION - PLANT VARIETY PROTECTION OFFICE

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

(Instructions and information collection burden statement on reverse)

1. NAME OF APPLICANT(S) (as it is to appear on the Certificate)

PROGENY ADVANCED GENETICS, INC.

4. ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP Code, and Country)

1536B MOFFETT STREET
SALINAS, CALIFORNIA 93905

The following statements are made in accordance with the Privacy Act
1974 (5 U.S.C. 552a) and the Paperwork Reduction Act (PRA) of 1995.

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

2. TEMPORARY DESIGNATION OR
EXPERIMENTAL NUMBER

PX 544

3. VARIETY NAME

CRUSADER

FOR OFFICIAL USE ONLY

PVPO NUMBER

9800351

FILING

DATE

August 3, 1998

FILING AND EXAMINATION FEE

\$ 2450.00

FEES

DATE

8/3/1998

RECEIVE

DATE

\$ 432.00

RECEIVED

DATE

9/14/2004

14. TELEPHONE (Include area code)

831-751-6030

15. FAX (Include area code)

831-751-6032

7. GENUS AND SPECIES NAME

LACTUCA SATIVA

8. FAMILY NAME (Botanical)

COMPOSITAE

9. CROP KIND NAME (Common name)

LETTUCE

10. IF THE APPLICANT NAMED IS NOT A "PERSON", GIVE FORM OF ORGANIZATION (corporation, partnership, association, etc.) (Common name)

CORPORATION

11. IF INCORPORATED, GIVE STATE OF INCORPORATION

CALIFORNIA

12. DATE OF INCORPORATION

DECEMBER 26, 1994

13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS

MR. NATHAN K. OLIVAS, PRESIDENT
PROGENY ADVANCED GENETICS, INC.
1536B MOFFETT STREET
SALINAS, CALIFORNIA 93905

16. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED (Follow instructions on reverse)

- Exhibit A. Origin and Breeding History of the Variety
- Exhibit B. Statement of Distinctness
- Exhibit C. Objective Description of the Variety
- Exhibit D. Additional Description of the Variety (Optional)
- Exhibit E. Statement of the Basis of the Applicant's Ownership
- Voucher Sample (2,500 viable untreated seeds or, for tuber propagated varieties verification that tissue culture will be deposited and maintained in an approved public repository)
- Filing and Examination Fee (\$2,450), made payable to "Treasurer of the United States" (Mail to PVPO)

17. DOES THE APPLICANT SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY, AS A CLASS OF CERTIFIED SEED? (See Section 831a of the Plant Variety Protection Act)
 YES If "yes," answer items 18 and 19 below NO If "no," go to item 20

18. DOES THE APPLICANT SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS?

YES NO

19. IF "YES" TO ITEM 18, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED?

FOUNDATION REGISTERED CERTIFIED

20. HAS THE VARIETY OR A HYBRID PRODUCED FROM THE VARIETY BEEN RELEASED, USED, OFFERED FOR SALE, OR MARKETED IN THE U.S. OR OTHER COUNTRIES?
 YES If "yes," give names of countries and dates NO

UNITED STATES OF AMERICA 8/06/97

21. The applicant(s) declare that a viable sample of basic seed of the variety will be furnished with application and will be replenished upon request in accordance with such regulations as may be applicable, or for a tuber propagated variety a tissue culture will be deposited in a public repository and maintained for the duration of the certificate.

The undersigned applicant(s) is/are the owner(s) of this sexually reproduced or tuber propagated plant variety, and believe(s) that the variety is new, distinct, uniform, and stable as required in Section 42, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act.

Applicant(s) is/are informed that false representation herein can jeopardize protection and result in penalties.

SIGNATURE OF APPLICANT (Owner(s))

SIGNATURE OF APPLICANT (Owner(s))

NAME (Please print or type)

NATHAN K. OLIVAS

NAME (Please print or type)

CAPACITY OR TITLE

PRESIDENT

DATE

JULY 29, 1998

DATE

EXHIBIT A

Origin and Breeding History

Crusader is an iceberg lettuce variety developed from a hand pollinated cross of Raider and Fallgreen made in 1993 in the San Joaquin Valley. The F1 seed harvested was designated as 9355X50. The two parental varieties were selected for their compatibility. Raider, selected for its heat tolerance and suitability for desert Fall plantings, and Fallgreen for its dark color, bolt tolerance and larger size. The cross was made to produce a large dark green iceberg lettuce for the early Fall desert plantings of Yuma Az and Huron Ca.

Approximately 40 plants of the F1 seed (9355X50) were planted in the San Joaquin Valley production for increase in 1994. The block was rogued, eliminating the self pollinating plants. The F2 seed was harvested in August 1994.

The F2 seed was designated as #144 and was evaluated in small trials in Yuma, Huron, and the Salinas Valley, then increased in our 1995 San Joaquin Valley production. The F2 seed (144) was rogued, eliminating the self pollinating plants. The remaining plants were harvested producing the F3 seed in the Fall of 1995.

The F3 seed was extensively trialed throughout the 1995/1996 growing season in Yuma, Huron Ca and in the Salinas Valley of Ca and was designated as PX 544 on January 16, 1996. PX 544 was increased in the 1996 San Joaquin Valley production selecting for the larger darker plants. PX544 was noted as stable, expressing the desired phenotypic traits.

The F4 seed was named "Crusader" in 1997 and trialed consistently during the 1996/97 growing seasons in the Fall plantings of Huron Ca and Yuma Az, and the Salinas Valley of Ca, exhibiting good uniformity. The F4 seed was increased in the 1997 San Joaquin Valley production where it was noted as stable. The F5 seed was then harvested.

During the 1997/98 growing season the F5 seed (Crusader) was extensively strip trialed in Yuma Az, Huron Ca, and in the Salinas Valley Ca. This variety is exhibiting good uniformity in size and growing habit, where it is noted as stable and with no variants. The F6 seed is being commercially increased in the 1998 San Joaquin Valley production.

**Exhibit A**

Additional information:

1. (#11)Crusader has been observed in commercial production, trials and seed production crops to be uniform and stable for 2 generations.

9800351

EXHIBIT A
Origin and Breeding History

	1993/94 F1 Seed	1994/95 F2 Seed	1995/96 F3 Seed	1996/97 F4 Seed	1997/98 F5 Seed	1998/99 F6 Seed
Cross Made	Increase 9355X50	Increase 144	Increase PX 544	Increase PX 544	Increase PX 544	Increase Crusader
Raider X Fallgreen	San Joaquin Valley ID: 144	San Joaquin Valley Plant: 4/95 Harvest: 8/95	San Joaquin Valley ID: PX 544	San Joaquin Valley Plant: 4/96 Harvest: 8/96	San Joaquin Valley ID: "Crusader"	San Joaquin Valley
San Joaquin Valley ID: 9355X50	Plant: 4/94 Harvest: 8/94	Trialed: Yuma: 2x Salinas Valley: 1x Huron: 1x	Trialed: Yuma: 6x Salinas Valley: 5x Huron: 3x	Trialed: Yuma: 3x Salinas Valley: 3x Huron: 3x	Plant: 4/97 Harvest: 8/97	Plant: 4/98
Harvest 8/93						



Exhibit B Revision
Statement of Distinctness

Crusader is a large heading iceberg lettuce variety developed for the fall plantings of the Huron California and Yuma Arizona lettuce production regions. This variety is large heading and fringed, providing an excellent option for growers that plant the commercial variety Raider. Crusader, being 2 to 3 days later maturing than Raider, allows growers to split plantings between the 2 varieties and increase their harvest options.

Crusader is most similar to the commercial variety Raider. Crusader is distinguished from Raider as it consistently demonstrates larger size as indicated by 4 quantitative traits. In 8 repeated trials, Crusader has proven to have a larger head diameter, a larger average head diameter, and a larger frame diameter. This data is supported statistically, at a minimum 95% confidence level in 8 repeated trials.

Crusader produces a larger plant than Raider, as indicated by the 4 measurements to follow.

1. Crusader has a larger head diameter. This measurement is made perpendicular to the core at the widest part of the sliced head. This data is statistically significant in 8 repeated trials, with a minimum confidence level of 99.8%.
2. Crusader has a larger average head diameter. This value is an average of the measured head diameter and measured head length. The measurement of the head length is made vertically from the base of the core to the top of the sliced head. This data is statistically significant in 4 repeated trials, with a minimum confidence level of 99.9%.
3. Crusader has a larger frame diameter. This measurement is made horizontally across the top of the growing lettuce plant at widest point of leaf margins. This data is statistically significant in 6 of 8 repeated trials, with the following minimum confidence levels: 100%, 62%, 99.9%, 100%, 100%, 99.9%, 100%, 92.9%. When the data is pooled the data is statistically significant with a confidence level of 100%.
4. Crusader produces a heavier head than Raider. This weight is representative of a harvested head of lettuce trimmed to market specs. This data is statistically significant in 4 of 8 repeated trials, with the following minimum confidence levels: 99.9%, 97.0%, 92.4%, 85.9%, 99.1%, 91.9%, 77.7%, 99.9%. When the data is pooled the data is statistically significant with a confidence level of 99.9 %.



In addition to the above mentioned distinctions, further distinctness is evident by observation of the trials comparing Crusader and Raider.

Crusader is distinct from the variety Raider in color. In trials evaluated, Crusader had color readings consistently darker than Raider. The leaf color was determined using the Munsell Color Chart for Plant Tissue.

<i>Color</i>		
<u>Trial</u>	<u>Crusader</u>	<u>Raider</u>
1	5gy4/6	5gy5/6
2	5gy5/4	5gy4/6
3	5gy5/4	5gy4/6
4	5gy5/6	2.5gy5/6

Crusader is typically 2-4 days later maturing than Raider.

<u>Variety</u>	<u>Wet Date</u>	<u>Maturity Date</u>
Crusader	9/20/98	12/2/98
Raider	9/20/98	11/29/98
Crusader	9/17/98	11/29/98
Raider	9/17/98	11/26/98
Crusader	12/4/98	3/16/99
Raider	12/4/98	3/12/99
Crusader	12/8/98	3/28/99
Raider	12/8/98	3/26/99



Trialing Protocol for Intellectual Property Protection.

I. Set Up

1. Parental lines and competing varieties are identified.
2. Primary slots are identified.
3. Necessary accession lines are located and purchased/received from seed dealers or growers.
4. All varieties are assigned a number to maintain integrity, and anonymity.
5. Trials are set up in the Progeny warehouse with all necessary varieties. Variety arrangement for trial is diagramed.

II. Planting

1. Commercial plantings are located by contacting commercial growers during the planting slot recommended for the variety.
2. Field is located during commercial planting, and the necessary rows and area is marked off by a Progeny employee with proper training.
3. Varieties are planted according to diagram, in 100 ft. ranges, consisting of roughly 200 plants.
4. All varieties are planted in same manner, to mimic the planting of the commercial variety as closely as possible.
5. A trial map is drawn diagramming the trial, the trial location in the field, and directions to the field.

III. Maintenance

1. All varieties are treated identically. The grower handles all watering, fertilization, and pest control, as if it was no different from the commercial field it is grown with.
2. Thinning of the trial is done by a crew contracted by the commercial grower.



IV. Evaluation

1. Evaluations are done as near to the time of the commercial harvest as possible by knowledgeable Progeny employees.
2. The evaluation is conducted "blindly". The evaluator(s) do not have the key to the trial at the time of evaluation.
3. 24 heads of each variety are evaluated.
 - a. The frame diameter of 24 random plants are measured to the nearest cm.
 - b. 24 mature heads of each variety are cut to the cap leaf.
 - c. The heads are carried to an adequate work station
 - d. The following measurements are then conducted and recorded:
 1. Each head is weighed to the nearest gram.
 2. The core diameter of each head is measured to the nearest mm.
 3. The heads are then sliced in to halves, discarding 1 half.
 4. The core lengths (from the cut stem to the core tip) are measured to the nearest mm.
 5. The head length (from the cut stem to the cap leaf) is measured to the nearest mm.
 6. The head diameter (at its widest point) is measured to the nearest mm.
 7. The ideal maturity or harvest date is then estimated based on the solidity of the head, the core length and any other physiological characteristics present.
 8. The leaf color is documented using the Munsell Color Charts for Plant Tissue.
 - e. From these measurements, we then use an Excell program to calculate the averages, the standard deviations and the T-Tests for the compared varieties.

9800351

Trial map : YMFD98005
 Wet Date: 12/4/1998
 Date evalc 3/13/1999

PVP DATA:
 Location: Dome Valley Ranch: Moore
 Grower: Nakasawa/T.A. Lot: 27
 Commercial variety:
 Desert Spring

Comparison of Head Characteristics

Sample #	Core length (cm)		Core Diam (cm)		Head diam. (cm)		Head length (cm)		Avg Head Diam/Feier		Frame diam (cm)		Head wt. (g)		
	Crusader	Raider	Crusader	Raider	Crusader	Raider	Crusader	Raider	Crusader	Raider	Crusader	Raider	Crusader	Raider	
1	2.5	1.9	3.3	3.4	14.9	13.6	15.0	12.1	15.0	12.9	6.0	6.8	50	42	
2	2.5	1.9	3.1	3.4	14.4	12.0	13.6	12.6	14.0	12.3	5.6	6.5	49	44	
3	2.4	2.3	3.6	3.0	14.0	12.6	13.8	13.4	13.9	13.0	5.8	5.7	47	46	
4	2.0	2.1	3.4	3.5	14.1	11.5	12.2	12.4	13.2	12.0	6.6	5.7	48	43	
5	2.4	2.7	3.0	3.5	14.4	12.7	13.1	13.9	13.8	13.3	5.7	6.3	45	47	
6	2.3	2.2	3.3	3.5	15.1	13.4	14.4	13.6	14.8	13.5	6.4	5.0	49	46	
7	1.9	2.2	3.9	3.0	13.8	12.2	12.6	12.7	13.2	13.0	6.9	5.9	49	49	
8	2.9	2.3	3.8	3.4	15.1	11.8	14.4	12.4	14.8	12.1	5.1	5.5	42	42	
9	2.2	2.7	3.7	3.5	13.9	15.1	13.4	13.3	13.7	14.2	6.2	6.2	44	44	
10	2.7	2.4	3.7	3.8	14.3	13.9	13.4	13.0	13.9	13.5	5.1	5.0	49	46	
11	1.9	1.9	3.5	3.6	14.0	14.1	12.5	14.2	13.3	14.2	7.0	7.0	59	43	
12	1.9	2.6	3.2	3.5	15.2	14.6	12.0	13.6	13.6	14.1	7.2	7.4	49	44	
13	2.3	2.8	3.5	3.1	14.1	13.6	12.5	11.5	13.3	12.6	5.8	4.8	47	48	
14	1.9	2.7	3.2	3.4	13.2	12.3	11.6	12.9	12.4	12.6	6.5	4.5	44	47	
15	2.1	1.9	3.0	3.8	14.6	14.2	12.5	13.4	13.6	13.8	6.5	5.1	43	46	
16	3.1	2.4	3.5	3.9	13.9	14.2	13.0	13.0	13.5	13.6	4.3	5.1	58	602	
17	2.1	1.5	3.4	3.3	13.7	13.8	12.6	12.0	13.2	12.9	6.3	6.6	44	516	
18	2.5	2.6	3.1	4.0	13.6	13.3	14.0	12.5	13.8	12.9	5.5	5.0	48	698	
19	2.5	2.6	3.6	3.6	13.2	14.4	12.4	13.3	12.8	13.9	5.1	5.3	48	662	
20	2.1	2.7	3.5	4.0	12.2	12.1	13.6	13.1	13.1	12.9	6.2	4.8	42	602	
21	2.0	2.7	3.5	3.6	13.1	14.1	11.3	10.5	12.2	12.3	6.1	4.6	46	544	
22	2.8	2.4	3.4	3.9	14.1	14.0	12.2	13.6	13.2	13.8	4.7	5.8	46	574	
23	2.9	2.4	3.2	3.7	14.6	13.8	14.2	13.0	14.4	13.4	5.0	5.6	46	628	
24	2.6	2.5	3.8	3.5	14.4	14.4	13.9	14.2	14.2	13.4	5.4	5.1	43	512	
25	2.4	1.9	3.5	3.6	13.1	12.6	12.3	10.4	12.7	11.5	5.3	6.1	44	466	
26	2.0	2.4	3.1	4.1	14.2	12.2	12.1	14.9	13.2	13.6	6.6	5.6	41	384	
27	2.6	2.2	3.3	3.7	14.9	11.9	12.9	14.9	13.9	13.4	5.3	6.1	47	530	
28	2.6	2.4	3.4	3.9	14.5	14.1	13.2	13.2	13.9	13.7	5.3	5.7	42	488	
29	2.4	2.5	3.6	3.3	14.4	14.2	13.3	11.2	13.9	12.7	5.8	5.1	41	686	
30	2.0	2.1	3.2	3.6	13.6	15.0	13.0	12.5	13.3	13.8	6.7	6.5	47	712	
Average	2.4	2.3	3.4	3.6	14.1	13.4	13.0	12.9	13.6	13.1	5.9	5.8	47	518	
Stan dev	0.337077	0.320721	0.242615	0.268755	15.25896	1.005586	0.896385	1.067815	0.654316	0.68606	0.713032	0.903871	44.0	557.7	530.3
T test	0.814697	0.034251	0.001311		99.86888	99.57492		0.64842	0.016822		0.683677	4.42E-09	0.222933	75.71222	
	18.53029				35.15798			98.11784			31.63229		100	77.70672	

Trial map #: RSV98098
Wet Date: 4/22/1998
Date evald: 6/20/1998

PVP DATA

Final map #: R3 V786078
Wet Date: 4/22/1998
Date evald: 6/20/1998

Comparison of Head Characteristics
Ranch/Lot: Sargent 6
Gilroy Mission Ranches

Venus

Commercial variety: Venus

9860357

Trial map #: RSJV98089
 Wet Date: 8/20/1998
 Date evald: 10/26/1998
 Location: Huron, TresPicos
 Grower: T&A

PVP DATA:
Comparison of Head Characteristics

Ranch/Lc36-3-3
 Commercial variety: Marvie

Sample #	Core length (cm)		Core Diam (cm)		Head diam (cm)		Head length (cm)		Avg Head Diameter (cm)		Avg Head Diam/Core Length		Frame diam (cm)		Head Weight (g)	
	Crusader	Raider	Crusader	Raider	Crusader	Raider	Crusader	Raider	Crusader	Raider	Crusader	Raider	Crusader	Raider	Crusader	Raider
1	2.9	2.9	3.4	3.2	1.6	12.0	15.9	12.7	15.95	12.35	5.5	4.3	45	44	614	712
2	2.3	2.6	3.5	3.2	15.1	12.1	15.5	12.5	15.3	12.3	6.7	4.7	46	46	572	616
3	2.2	2.4	3.0	2.9	15.9	12.0	14.9	12.4	15.4	12.2	7.0	5.1	49	42	488	434
4	3.1	2.8	3.2	3.0	13.9	13.9	14.6	11.8	14.25	12.85	4.6	4.6	44	44	444	528
5	3.4	3.1	3.3	2.5	14.3	13.4	14.5	12.9	14.4	13.15	4.2	4.2	47	44	562	478
6	3.3	3.6	3.2	3.6	13.9	12.5	16.9	13.9	15.4	13.2	4.7	3.7	48	45	592	492
7	2.9	3.4	3.0	3.0	15.2	13.4	15.6	13.9	15.4	13.65	5.3	4.0	47	44	596	492
8	2.4	2.8	3.3	3.3	14.7	12.1	14.9	14.4	14.8	13.25	6.2	4.7	49	43	558	534
9	2.4	3.9	3.1	3.3	13.1	13.0	13.5	15.6	13.3	14.3	5.5	3.7	48	49	518	612
10	3.4	4.0	3.4	2.7	14.5	12.4	13.0	12.1	13.75	12.25	4.0	3.1	48	44	626	722
11	2.4	2.4	2.9	2.9	14.7	12.2	13.3	13.4	14	12.8	5.8	5.3	45	45	548	438
12	2.6	3.6	3.4	2.6	13.9	13.1	14.0	14.0	13.95	13.55	5.4	3.8	44	47	610	552
13	2.4	3.9	3.9	3.1	15.1	14.0	16.2	13.8	15.65	13.9	6.5	3.6	46	42	724	526
14	2.5	3.4	3.6	3.0	12.5	14.0	13.5	13.0	13	13.5	5.2	4.0	47	43	722	426
15	3.2	3.4	2.8	15.7	13.2	14.0	14.1	14.85	13.65	4.6	3.9	46	41	588	542	
16	4.2	3.1	3.2	3.0	15.5	12.9	14.0	15.0	14.75	13.95	3.5	4.5	47	46	596	610
17	3.3	2.4	3.4	3.2	16.5	15.0	13.0	14.9	14.75	14.95	4.5	6.2	48	47	504	606
18	3.9	2.9	3.5	3.4	14.5	12.5	15.4	13.5	14.95	13	3.8	4.5	50	43	514	500
19	4	3.5	3.2	3.1	15.9	14.4	16.2	14.0	16.05	14.2	4.0	4.1	47	44	498	378
20	2.4	3.0	3.5	3.5	14.5	12.4	15.5	13.6	15	13	6.3	4.3	49	42	558	512
21	2.5	2.8	3.5	3.1	14.4	13.0	13.5	13.0	13.95	13	5.6	4.6	50	44	614	694
22	2.9	3.2	3.6	3.2	16.2	13.3	14.9	15.7	15.55	14.5	5.4	4.5	45	46	638	556
23	2.9	2.4	3.4	3.5	14.9	12.1	13.4	14.15	12.75	4.9	5.3	48	45	512	484	
24	2.4	2.8	3.3	3.3	13.4	13.9	13.9	12.7	13.65	13.3	5.7	4.8	52	48	636	436
25	2.9	2.2	3.5	3.0	14.5	14.0	13.4	13.0	13.95	13.5	4.8	6.1	46	43	482	428
26	3	4.5	3.3	2.7	14.9	13.4	13.7	15.1	14.3	14.25	4.8	3.2	50	45	534	686
27	2.6	2.7	3.2	2.7	12.9	10.8	13.9	13.4	12.35	5.2	4.6	51	42	608	5660	
28	3.1	3.6	3.0	2.9	14.0	12.5	13.5	13.4	13.75	12.95	4.4	3.6	49	46	864	580
29	3.4	3.6	3.3	3.2	14.6	13.9	14.5	15.5	14.55	14.7	4.3	4.1	47	46	600	678.0
30	3.5	3.3	3.4	16.5	14.2	14.9	13.1	15.7	13.65	4.5	3.9	46	47	656	518	
Average	2.9	3.2	3.3	3.1	14.7	13.1	14.5	13.7	14.6	13.4	4.4	4.4	47.4	44.6	585.9	544.5
Stan dev	0.53481117	0.565533	0.203306	0.275665	1.02946	0.9239	1.06036	1.0334687	0.8325646	0.7497298	0.873332505	0.747938309	2.1270021	1.95965	84.3669053	92.500786
T test	0.15784644	0.000168	1.3E+08	0.00495	1.297E-07		0.000959076		1.472E-06		0.07574604					
Probability %	84.2153563	99.98323	100	99.5054	99.99987		99.9040924		99.999853		92.4253962					

11

Trial map #: RSV98072
 Wet Date: 6/15/1998
 Date evald: 8/10/1998

PVP DATA:
 Comparison of Head Characteristics
 Location: King City, California
 Ranch/Lot: Coastal 204
 Commercial variety: SunDevil
 Grower: Mission Ranches

9800351

Sample #	Core length (cm)	Core Diam (cm)	Head diam (cm)	Head length (cm)	Avg Head Diameter (cm)	Avg Head Diam:Core	Frame diam (cm)	Head Weight (g)
	Crusader	Raider	Crusader	Raider	Crusader	Raider	Crusader	Raider
1	3.3	3.5	3.2	3.5	14.2	14.5	17	16.5
2	3.3	4.2	3.2	3.0	15.0	14.5	14.0	15.5
3	3.0	4.7	3.0	3.0	14.0	13.0	16.0	15
4	4.5	4.2	3.0	3.8	13.5	15.0	14.8	14.65
5	3.0	5.2	3.5	4.0	15.2	13.5	14.5	14.85
6	4.2	5.8	3.2	3.3	14.5	14.0	15.2	15.25
7	3.4	3.5	3.3	17.9	14.5	15.2	16.5	16.55
8	4.0	4.6	3.5	3.5	14.0	13.5	15.0	14.35
9	4.2	4.0	3.3	3.5	12.2	14.0	16.1	14.15
10	3.0	4.1	3	3.9	14.2	13.5	15.5	14.85
11	4.0	5.6	3.0	4.0	15.5	13.8	15.2	16.5
12	3.8	3.2	3.6	2.9	13.5	14.0	15.2	14.35
13	4.5	5.7	3.0	4.0	16.2	13.5	17.0	16.6
14	5.2	4.1	3.5	4.0	15.9	12.0	15.2	14.8
15	4.5	4.7	3.5	3.2	14.2	13.6	16.2	15.7
16	4.7	4.7	3.6	3.5	14.5	13.2	15.8	15.5
17	4.2	4.4	3.5	3.5	13.5	14.0	16.0	14.8
18	3.3	4.6	3.7	3.0	16.2	13.8	17.0	15.0
19	4.2	3.7	3.0	3.5	14.2	13.5	14.4	14.3
20	3.2	3.6	3.0	3.7	15.0	13.5	15.0	14.5
21	2.8	5.0	3.2	3.2	15.0	13.0	16.0	15.5
22	3.0	6.0	3.5	3.6	13.9	14.0	15.5	16.5
23	4.5	4.5	3.5	3.5	14.5	12.0	17.0	15.3
24	3.2	4.8	3.5	3.5	15.5	15.5	13.9	15.5
25	3.8	3.8	3.4	3.2	12.0	14.0	15.5	16.0
26	3.5	5.3	3.5	3.8	15.5	13.5	16.2	15.5
27	5.0	5.5	3.2	3.6	14.5	14.6	15.5	15.55
28	3.9	5.3	3.2	3.9	15.5	13.0	16.0	15.5
29	3.5	5.1	3.4	3.2	14.5	14.2	16.0	14.0
30	4.2	4.4	3.5	3.5	15.0	14.0	16.5	16.0
Average	3.8	4.6	3.3	3.5	14.6	13.8	15.7	15.4
Stan dev	0.65397986	0.750601	0.225424	0.32746	1.17347	0.7597	0.7610942	0.786524
T test	9.3172E-05		0.016066		0.00119		0.0692244	
Probability %	99.9906828	98.39341	99.8807		93.07756		99.99394	99.99896
							62.280869	97.0194486

9800351

Trial map #: RSJV98090
 Wet Date: 8/27/98
 Date evald: 10/30/1998
 Location: Huron Ranch/Lc Lowe 3
 Grower: Royal Packing

PVP DATA:
 Comparison of Head Characteristics
 Crusader Raider

Commercial variety:
 Crusader Raider

Sample #	Core length (cm)	Core Diam (cm)	Head diam (cm)	Head length (cm)	Avg Head Diameter (cm)	Avg Head Diam:Core Length	Frame diam (cm)	Head Weight (g)
	Crusader	Raider	Crusader	Raider	Crusader	Raider	Crusader	Raider
1	2.4	3	3.5	14.5	15.1	15.6	15	15.05
2	2.6	2.7	3.6	3.5	15.7	14.2	14.0	14.95
3	2.4	2.4	3.5	3.0	14.5	13.9	14.1	14.25
4	3.1	2.1	3.6	4.0	15.7	13.3	14.1	8.5
5	3.3	2.9	3.4	3.5	16.2	15.2	14.8	13.35
6	2.9	2.6	3.5	3.8	15.7	13.6	14.1	14.4
7	3	3.2	3.4	2.4	18.1	14.3	15.2	15.5
8	3.4	2.5	3.5	3.3	16.7	14.4	14.6	12.5
9	2.9	3.0	3.4	3.4	16.5	14.6	15.2	15.65
10	3.3	2.5	3.5	3.5	15.4	14.2	14.9	13.7
11	2.9	2.6	3.2	3.1	17.1	13.5	16.7	14.2
12	2.5	2.6	3.2	3.2	15.6	14.1	14.7	12.7
13	3.4	3.8	3.7	2.9	16.4	14.4	15.2	15.85
14	2.8	3.2	3.4	3.2	16.4	13.9	15.0	14.05
15	2.9	3.1	3.5	3.2	17.6	13.9	14.8	15.85
16	2.9	3.0	3.2	3.2	14.7	15.6	14.2	14.45
17	2.8	3.1	3.6	3.0	14.2	14.2	14.0	13.45
18	3.1	3.1	3.2	3.3	14.6	15.4	13.9	14.1
19	2.5	3.1	3.9	3.3	16.0	14.9	15.0	15.2
20	2.4	2.4	3.3	2.9	15.9	13.4	14.1	15.1
21	2.9	2.5	3.6	3.2	16.5	14.3	16.0	13.4
22	3.4	2.9	3.4	3.3	18.2	13.9	16.4	12.8
23	2.4	3.0	3.2	3.1	14.3	14.7	14.3	14.95
24	2.9	2.8	3.5	3.4	16.4	14.0	15.1	14.15
25	2.5	2.9	3.5	3.1	14.9	14.1	13.5	13.7
26	3.2	3.2	3.3	3.6	14.6	14.1	15.4	14.2
27	2.5	3.0	3.4	3.4	15.4	14.6	14.1	14.75
28	2.5	2.7	3.2	3.0	14.9	15.6	14.4	14.65
29	3.2	4.1	3.3	3.3	16.5	15.9	14.3	14.4
30	2.4	3.2	3.5	3.5	16.2	15.8	14.6	15.7
Average	2.8	2.9	3.4	3.3	15.8	14.4	14.8	13.6
Stan dev	0.34314301	0.406782	0.168836	0.362176	1.08174	0.7138	0.77085	2.14957895
T test	0.53930869	0.018385	1.9E-07		6.371E-06		0.000719064	1.707E-16
Probability %	46.0691309	98.16152	100	99.5724	99.999363	99.92809356	100	85.907076

9800351

PVP DAT Crusader vs Raider

Trial map #: Rym98109
 Wet Date: 9/20/98
 Date evad: 11/30/98

Location: Texas Hill Ranch: 14-6
 Grower: BFP Lot: South

Comparison of Head Characteristics

Sample #	Core length (cm)		Core diam (cm)		Head diam (cm)		Head length (cm)		Avg Head Diameter (cm)		Frame diam (cm)		Head Weight (g)	
	Crusader	Raider	Crusader	Raider	Crusader	Raider	Crusader	Raider	Crusader	Raider	Crusader	Raider	Crusader	Raider
1	2.4	3.5	3.8	3.6	15.4	15.1	14.5	15.0	14.8	15.2	4.2	5.0	50	944
2	3.4	3.8	3.6	3.8	16.9	13.3	15.5	13.6	16.2	13.5	4.8	5.5	51	696
3	3.2	3.0	3.6	3.5	14.9	13.8	13.4	13.6	14.2	13.7	4.4	4.6	52	748
4	3.1	2.6	3.4	3.5	14.7	14.0	14.0	13.2	14.4	13.6	4.6	5.2	49	668
5	2.9	3.4	3.5	3.2	17.5	15.2	13.8	14.9	15.7	15.1	4.4	5.5	47	616
6	3.8	4.0	3.6	3.6	16.2	15.6	16.0	15.0	16.1	15.3	4.2	4.2	57	624
7	3.1	3.4	3.9	3.5	16.1	14.8	14.2	14.2	15.2	14.5	4.9	4.3	51	768
8	3.7	2.7	3.5	3.5	16.6	14.0	15.0	13.5	15.8	13.8	4.3	5.1	50	508
9	3.6	2.9	3.6	3.6	14.8	14.1	15.9	13.6	15.4	13.9	4.3	4.8	53	592
10	3.1	3.9	4	3.4	16.5	14.6	13.2	14.0	14.9	14.3	4.8	3.7	53	730
11	2.5	2.2	3.8	3.2	16.0	14.0	14.9	13.9	15.5	14.0	6.2	6.3	51	660
12	2.9	3.2	3.7	3.4	16.9	15.3	14.9	15.0	15.9	15.3	5.5	4.8	47	712
13	3.6	3.6	3.9	3.4	15.8	15.1	14.2	14.4	15.0	14.8	4.2	4.1	51	636
14	3.8	2.6	3.2	3.3	16.4	14.0	14.1	12.8	15.3	13.4	4.0	5.2	49	600
15	3.2	3.1	3.4	3.5	15.3	13.2	14.5	13.0	14.9	13.1	4.7	4.2	54	534
16	4	3.7	3.6	3.4	17.3	15.0	15.4	15.3	16.4	15.2	4.1	4.1	54	742
17	3.2	3.1	3.7	3.5	14.9	15.5	14.3	15.5	14.6	15.5	4.6	5.0	56	776
18	2.9	3.2	3.5	3.8	16.4	15.7	14.6	15.5	15.5	15.6	5.3	4.9	50	746
19	3.0	3.9	3.6	3.2	15.9	15.0	13.9	14.8	14.9	14.9	5.0	3.8	54	816
20	2.9	3.5	3.8	3.0	17.1	16.6	14.7	16.0	15.9	16.3	5.5	4.7	51	666
21	3.0	3.0	3.4	3.7	16.6	13.3	14.8	13.1	15.7	13.2	5.2	4.4	58	796
22	3.5	3.5	3.5	3.2	16.4	13.3	14.7	14.1	15.6	13.7	4.4	3.9	54	664
23	3.7	3.1	3.5	3.0	16.1	14.6	14.5	15.5	15.3	15.1	4.1	4.9	55	740
24	3.5	3.4	3.5	3.6	15.6	13.2	15.0	14.2	15.3	13.7	4.4	4.0	58	773
25	2.6	2.5	3.7	3.5	16.6	15.5	14.2	14.6	15.4	15.1	5.9	6.0	53	756
26	3.3	3.0	3.5	3.7	16.1	15.0	15.1	14.1	15.6	14.6	4.7	4.9	54	732
27	3.3	3.1	3.5	3.6	14.9	14.4	14.5	14.2	14.7	14.3	4.5	4.6	53	618
28	3.4	3.4	3.4	3.8	15.5	14.6	14.4	14.2	15.0	14.4	4.4	4.2	53	586
29	3.2	3.2	3.5	3.2	16.0	14.6	14.8	14.6	15.4	14.6	4.8	4.6	53	734
30	3.5	3.2	3.6	3.5	16.9	15.0	14.6	15.0	15.8	15.0	4.5	4.7	50	732
Average	3.2	3.2	3.6	3.5	16.1	14.6	14.6	14.3	15.3	14.5	4.8	4.6	52.4	660.7
Stand dev	0.391886	0.436035	0.176036	0.217641	0.77356	0.8617	0.63612	0.821332	0.5308554	0.8003322	0.6105262	0.6292997	2.4023456	84.859857
T test	0.852428	0.009717	2.4E-09	0.18123	6.024E-06	0.1494313	4.871E-11	0.0091474						
Probability %	14.75721	99.07833		100	81.8768	99.99398		85.056875		100	99.082601			

9800351

PVP DAT: Crusader vs. Raider**Comparison of Head Characteristics**

Trial map #: NA
 Wet Date: 10/17/98
 Date evald: 12/9/98
 Location: Yuma Valley
 Grower: C&E/Ocean Mist
 Ranch: N Fletcher
 Lot: 3
 Commercial variety: Crusader/Raider

Sample #	Core length (cm)		Core diam (cm)		Head diam (cm)		Head length (cm)		Avg Head Diameter (cm)		Frame diam (cm)		Head Weight (g)	
	Crusader	Raider	Crusader	Raider	Crusader	Raider	Crusader	Raider	Crusader	Raider	Crusader	Raider	Crusader	Raider
1	3.4	3.5	3.7	4.5	17.5	16.2	15.1	16.9	15.7	15.0	4.5	5.4	52	101.4
2	3.1	3.9	3.7	3.6	16.4	15.2	13.4	15.9	14.9	15.6	4.8	4.0	54	47
3	4.4	2.9	3.5	4.4	16.7	14.4	15.3	12.8	16.0	13.6	3.6	4.7	53	788
4	2.8	3.3	3.7	3.6	16.6	15.4	13.2	12.2	14.9	13.8	5.3	4.2	50	664
5	2.9	3.6	4	3.9	16.2	14.1	15.0	15.2	15.6	5.2	4.3	52	53	796
6	3.7	3.5	3.5	3.9	15.2	16.9	14.0	13.6	15.3	3.9	4.4	54	49	582
7	3.0	3.1	3.8	3.7	16.1	14.3	16.1	13.1	16.1	13.7	5.4	4.4	50	874
8	4.0	2.9	4.1	4.2	15.5	12.8	15.9	13.6	15.7	13.2	3.9	4.6	52	1020
9	3.5	2.7	4	4.4	18.4	14.5	16.9	13.4	17.7	14.0	5.0	5.2	52	842
10	4.2	3.9	3.9	4.1	16.8	14.4	15.9	14.5	16.4	14.5	3.9	4.4	48	716
11	3.4	3.0	4.2	4.3	17.4	14.2	14.9	12.0	16.2	13.1	4.8	4.4	49	780
12	3.2	3.5	4	4.0	17.4	15.5	15.1	14.9	16.3	15.2	5.1	4.3	54	836
13	4.8	4.4	3.9	3.8	16.3	14.5	17.2	15.1	16.8	14.8	3.5	3.4	52	968
14	3.6	3.7	4.4	3.5	17.1	16.5	15.2	13.2	16.2	14.9	4.5	4.0	56	766
15	4.2	2.8	4	3.9	19.4	16.5	15.9	14.1	17.7	15.3	4.2	5.5	57	818
16	3.1	4	3.6	3.6	15.2	16.4	14.8	15.6	15.0	16.0	4.8	4.0	56	742
17	2.7	3.1	3.9	3.9	16.4	16.9	14.1	14.0	15.3	15.5	5.6	5.0	55	604
18	3.8	2.9	4.1	3.8	16.9	15.2	14.4	12.5	15.7	13.9	4.1	4.8	51	862
19	3.5	4.1	3.9	3.7	16.1	14.9	15.5	13.3	15.8	14.1	4.5	3.4	52	738
20	2.8	3.0	3.9	3.8	16.1	14.7	14.9	14.4	15.5	14.6	5.5	4.9	51	752
21	3.9	3.6	3.7	3.6	18.1	16.4	15.4	14.8	16.8	15.6	4.3	4.3	54	880
22	3.8	3.1	3.9	4.1	17.9	15.5	15.2	12.7	16.6	14.1	4.4	4.5	52	548
23	3.1	3.9	3.4	3.4	17.4	16.4	13.9	13.7	15.7	15.1	5.0	3.9	51	814
24	3.4	3.0	3.6	4.3	15.5	14.9	13.9	14.4	14.7	14.7	4.3	4.9	51	622
25	2.8	3.6	4.1	3.8	14.4	17.1	14.2	12.8	14.3	15.0	5.1	4.2	51	800
26	2.9	3.2	3.8	3.9	17.6	14.5	14.1	13.9	15.9	14.2	5.5	4.4	46	772
27	3.3	3.5	3.8	3.7	18.1	17.6	14.4	15.2	16.3	16.4	4.9	4.7	51	596
28	3.0	2.7	3.9	3.6	14.2	16.3	14.7	14.1	14.5	15.2	4.8	5.6	52	696
29	3.5	3.2	4.1	4.0	17.2	15.2	15.4	14.1	16.3	14.7	4.7	4.6	52	930
30	3.9	3.2	3.7	3.9	14.5	15.3	14.9	13.9	14.7	14.6	3.8	4.6	50	1220
Average	3.5	3.4	3.9	3.9	16.6	15.5	15.0	13.9	15.8	14.7	4.7	4.4	50	786
Std dev	0.531545	0.446133	0.225597	0.287058	1.23411	1.088	1.0123888	0.8849634	0.8275848	0.59660798	0.5173977	1.7538136	1.18.904452	118.78922
T test	0.448575	0.584189	0.00039	0.00015	7.923E-06		0.1428655	6.708E-09	0.08080149					
Probability %	55.14245	41.58113		99.9605	99.985		99.999208	85.71345	99.999999	99.999999				
														5

5

9800351

Trial map : YM-PD98007
 Wet Date: 12/8/98
 Date evald 3/25/99
 Location: Texas Hill
 Grower: BFP/Dole
 Ranch: 21B-2
 Lot:

PVP DATA:

Comparison of Head Characteristics

Commercial variety:
 daneburg.66

Sample #	Core length (cm)				Core diam. (cm)				Head diam. (cm)				Head length (cm)				Avg Head Diameter (cm)				Frame diam (cm)				Head wt. (g)			
	Crusader	Raider	Crusader	Raider	Crusader	Raider	Crusader	Raider	Crusader	Raider	Crusader	Raider	Crusader	Raider	Crusader	Raider	Crusader	Raider	Crusader	Raider	Crusader	Raider	Crusader	Raider	Crusader	Raider	Crusader	Raider
1	2.6	2.1	3.2	3.2	15.5	13.6	13.9	13.2	14.7	13.4	14.7	13.4	14.7	13.2	13.0	13.2	13.4	13.4	13.2	13.4	13.4	13.4	13.4	13.4	47	774	722	
2	2.3	2.0	3.6	3.3	14.7	14.4	14.4	14.4	13.6	14.6	14.0	14.0	14.0	14.0	13.5	14.3	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	49	768	684	
3	2.6	2.4	3.8	3.1	14.2	14.4	14.4	14.4	13.5	14.3	14.0	14.0	14.0	14.0	14.2	14.7	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	46	848	640	
4	3.6	2.6	3.5	3.3	13.9	14.2	15.5	14.1	14.1	14.7	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	50	734	844	
5	2.3	2.4	3.2	3.1	14.2	13.1	14.8	14.9	14.5	14.5	14.0	14.0	14.0	14.0	14.8	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	45	892	726	
6	2.8	2.6	3.6	3.4	14.5	14.9	15.0	14.0	14.8	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	46	848	636	
7	2.0	2.3	3.4	3.2	13.0	13.2	13.2	13.2	13.5	13.1	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	47	700	774	
8	2.8	2.5	3.5	3.4	14.0	14.7	14.6	14.6	15.6	14.3	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	49	624	740	
9	2.9	3.2	3.2	3.4	14.1	14.5	16.1	15.4	15.4	15.1	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	47	740	724	
10	2.2	1.9	3.2	3.2	13.6	13.3	15.1	13.2	14.4	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	47	964	764	
11	2.7	2.0	3.7	3.2	13.4	13.8	14.2	13.6	13.8	13.7	13.7	13.7	13.7	13.7	13.7	13.7	13.7	13.7	13.7	13.7	13.7	13.7	13.7	13.7	49	49	554	
12	3.5	2.1	3.7	3.2	15.8	14.5	16.4	14.5	14.5	16.1	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	46	44	1016	
13	3.2	2.4	3.6	3.3	14.4	12.8	14.5	13.1	14.5	13.0	14.5	13.0	14.5	13.0	14.5	13.0	14.5	13.0	14.5	13.0	14.5	13.0	14.5	13.0	50	47	902	
14	3.1	2.0	3.5	3.0	14.5	3.4	14.2	16.1	14.4	9.8	14.4	9.8	14.4	9.8	14.4	9.8	14.4	9.8	14.4	9.8	14.4	9.8	14.4	9.8	48	860	670	
15	2.7	2.0	3.4	3.5	15.9	14.4	14.5	15.9	15.9	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	46	4	824	
16	3.2	2.0	3.4	3.5	14.2	16.3	15.1	13.4	14.7	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	45	874	670	
17	2.6	2.5	3.6	3.1	13.6	13.5	14.9	16.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	47	43	820	
18	2.0	2.2	3.8	3.0	14.0	14.2	14.4	13.6	14.2	13.9	14.2	13.9	14.2	13.9	14.2	13.9	14.2	13.9	14.2	13.9	14.2	13.9	14.2	13.9	45	49	610	
19	3.4	2.2	3.5	3.0	16.4	12.6	17.0	16.4	16.7	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	49	44	624	
20	3.6	2.7	3.6	3.2	15.4	12.5	15.4	15.4	14.9	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	51	49	706	
21	2.7	2.0	3.8	3.2	15.5	12.8	15.5	15.5	15.5	13.3	15.5	13.1	15.5	13.1	15.5	13.1	15.5	13.1	15.5	13.1	15.5	13.1	15.5	13.1	50	49	734	
22	3.1	2.9	3.9	3.4	13.0	13.9	15.1	14.8	14.1	14.1	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	45	670	732	
23	3.0	2.3	3.2	2.6	16.1	13.9	15.4	14.2	15.8	14.1	14.2	15.8	14.1	14.2	15.8	14.1	14.2	15.8	14.1	14.2	15.8	14.1	14.2	15.8	14.1	51	50	866
24	3.2	2.4	3.6	3.4	13.4	13.6	15.0	15.1	14.2	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	47	47	852	
25	2.9	2.1	3.5	3.5	14.9	13.2	15.3	14.5	15.1	13.9	13.9	13.9	13.9	13.9	13.9	13.9	13.9	13.9	13.9	13.9	13.9	13.9	13.9	13.9	46	44	684	
26	3.1	2.4	3.6	3.4	15.4	12.9	14.4	13.3	14.9	13.1	14.9	13.1	14.9	13.1	14.9	13.1	14.9	13.1	14.9	13.1	14.9	13.1	14.9	13.1	45	51	680	
27	3.3	2.4	3.4	3.3	14.1	12.6	16.9	13.3	15.5	13.0	14.7	15.4	14.7	14.7	15.4	14.7	14.7	15.4	14.7	14.7	15.4	14.7	14.7	15.4	14.7	47	47	756
28	3.5	2.3	3.6	3.4	14.5	13.6	16.2	14.2	15.4	13.9	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	46	44	660	
29	3.0	2.7	3.2	3.4	13.5	13.2	14.6	14.1	13.9	13.9	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	51	45	682	
30	2.1	2.5	3.1	3.5	14.5	13.9	14.5	14.5	15.6	14.5	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	44	44	650	
Average	2.9	2.3	3.5	3.3	14.5	13.4	15.0	14.4	14.7	13.9	14.7	13.9	14.7	13.9	14.7	13.9	14.7	13.9	14.7	13.9	14.7	13.9	14.7	13.9	48.4	45.2	785.3	
Stand dev	0.488551	0.302271	0.214127	0.197717	0.921388	2.062553	0.859885	1.031816	0.730063	1.014301	0.875382	1.809866	0.875382	1.809866	1.809866	1.809866	1.809866	1.809866	1.809866	1.809866	1.809866	1.809866	1.809866	1.809866	1.809866	47	47	677.6
T test	2.65E-06	3.21E-05	0.011486	0.012791	0.000424	0.00017	0.00017	0.00017	0.00017	0.00017	0.00017	0.00017	0.00017	0.00017	0.00017	0.00017	0.00017	0.00017	0.00017	0.00017	0.00017	0.00017	0.00017	0.00017	44	44	3.23E-05	
	99.99973	99.99679	98.85138	98.72093	99.95764	98.93032	98.83032	99.95514	99.99677																			

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9800351

POOLED DATA FROM 8 TRIALS

Sample	Frame diam (cm)		Head Weight (g)	
	Crusader	Raider	Crusader	Raider
1	57	44	590	486
2	56	51	588	690
3	48	53	584	668
4	50	48	592	462
5	57	52	608	510
6	55	54	554	600
7	50	53	662	550
8	59	50	634	604
9	50	48	564	606
10	54	52	620	584
11	53	47	638	518
12	51	51	526	592
13	56	47	518	490
14	54	52	502	534
15	59	46	684	496
16	55	51	634	614
17	55	49	540	498
18	57	51	842	606
19	57	53	686	484
20	56	47	620	500
21	53	53	686	400
22	55	45	546	536
23	59	47	694	604
24	61	42	680	670
25	57	49	592	572
26	54	49	636	458
27	53	51	690	456
28	52	41	566	576
29	52	51	590	394
30	54	44	704	620
31	56	47	554	524
32	54	54	648	440
33	55	50	556	374
34	52	46	690	636
35	51	46	564	534
36	56	54	610	548
37	59	44	620	468
38	54	51	590	494
39	56	50	642	508
40	52	47	656	566
41	50	46	680	734
42	50	50	754	756
43	45	44	826	734
44	43	42	800	910
45	42	45	912	990
46	39	42	854	876
47	44	44	900	880
48	47	50	748	762
49	45	46	1036	880
50	42	48	702	706
51	47	45	944	902
52	48	47	912	760

9800351

Sample	Frame diam (cm)		Head Weight (g)	
	Crusader	Raider	Crusader	Raider
53	44	45	788	838
54	44	42	708	734
55	49	40	906	692
56	42	40	962	670
57	42	49	1014	816
58	49	47	774	756
59	48	42	796	684
60	45	44	876	816
61	45	44	966	788
62	48	45	850	786
63	44	43	734	906
64	48	42	848	778
65	48	42	788	800
66	36	40	986	760
67	44	42	808	818.0
68	42	44	786	834
69	46	47	776	748.0
70	44	42	950	764
71	45	44	614	712
72	46	46	572	616
73	49	42	488	434
74	44	44	444	528
75	47	44	562	478
76	48	45	592	492
77	47	44	596	492
78	49	43	558	534
79	48	49	518	612
80	48	44	626	722
81	43	45	548	438
82	44	47	610	552
83	46	42	724	526
84	47	43	722	426
85	46	41	588	542
86	47	46	596	610
87	48	47	504	606
88	50	43	514	500
89	47	44	498	378
90	49	42	558	512
91	50	44	614	694
92	45	46	638	556
93	48	45	512	484
94	52	48	636	436
95	46	43	482	428
96	50	45	534	686
97	51	42	608	566.0
98	49	46	864	580
99	47	46	600	678.0
100	46	47	656	518
101	46	42	530	728
102	48	45	530	316
103	49	48	648	790
104	52	43	672	432
105	52	43	654	426
106	51	41	614	784
107	50	47	460	600

Sample	Frame diam (cm)		Head Weight (g)	
	Crusader	Raider	Crusader	Raider
108	49	41	616	640
109	46	42	578	454
110	52	45	680	422
111	49	45	552	586
112	51	42	524	386
113	53	46	610	700
114	48	43	802	646
115	52	46	666	556
116	46	44	524	526
117	49	44	590	724
118	49	43	672	572
119	50	46	620	470
120	48	44	540	406
121	47	41	602	674
122	49	42	736	616
123	48	44	686	602
124	49	42	544	688
125	50	40	714	526
126	48	45	608	500
127	47	43	772	708.0
128	49	41	610	592
129	51	45	662	670.0
130	51	42	662	718
131	50	50	944	666
132	58	51	696	678
133	52	50	748	668
134	54	49	662	616
135	55	47	624	566
136	57	47	768	662
137	51	48	856	508
138	50	48	592	730
139	53	49	682	712
140	55	53	936	502
141	51	48	778	538
142	54	47	763	660
143	51	52	676	636
144	52	49	618	600
145	54	51	710	534
146	54	50	700	742
147	56	46	724	776
148	50	48	782	746
149	54	48	604	816
150	51	50	688	666
151	58	49	796	546
152	54	49	534	664
153	55	52	690	740
154	58	51	778	670
155	53	48	746	756
156	54	48	734	732
157	53	51	630	618
158	53	46	688	586
159	53	46	792	734
160	50	47	730	752
161	54	52	1014	902
162	54	47	702	788

9800351

Sample	Frame diam (cm)		Head Weight (g)	
	Crusader	Raider	Crusader	Raider
163	53	45	664	796
164	50	53	874	582
165	52	49	876	1020
166	54	48	740	716
167	54	49	102	780
168	52	50	836	968
169	52	52	712	842
170	53	54	800	766
171	56	49	984	818
172	54	48	632	742
173	56	51	1030	604
174	56	51	862	820
175	57	52	756	738
176	56	48	880	680
177	55	47	896	626
178	54	52	856	716
179	52	51	760	752
180	51	52	856	548
181	54	50	814	622
182	52	51	936	830
183	54	46	778	596
184	51	51	830	800
185	51	51	820	772
186	54	47	798	562
187	53	52	608	696
188	52	50	932	930
189	52	50	1220	786
190	54	50	1060	658
191	48	47	774	722
192	49	49	768	684
193	47	46	848	640
194	50	50	734	844
195	49	45	892	726
196	46	44	848	636
197	47	49	700	774
198	49	49	624	740
199	47	52	740	724
200	47	43	964	764
201	49	43	902	554
202	46	44	1016	672
203	50	47	902	666
204	48	48	860	670
205	46	4	824	560
206	49	45	874	670
207	47	43	820	690
208	45	49	610	566
209	49	44	624	644
210	51	49	706	766
211	50	49	734	666
212	51	45	670	732
213	50	50	868	516
214	47	49	702	660
215	49	48	916	680
216	47	46	780	734
217	49	47	852	720

9800351

Sample	Frame diam (cm)		Head Weight (g)	
	Crusader	Raider	Crusader	Raider
218	46	44	684	576
219	51	45	660	682
220	52	44	662	650
221	50	42	836	518
222	49	44	538	596
223	47	46	534	474
224	48	43	558	530
225	45	47	584	590
226	49	46	536	488
227	49	46	456	376
228	49	42	558	538
229	44	44	428	466
230	49	45	470	466
231	49	43	586	602
232	49	44	516	698
233	47	48	538	662
234	44	47	546	512
235	50	44	466	562
236	48	42	790	544
237	46	42	484	574
238	48	46	562	628
239	48	42	602	486
240	46	42	514	530
241	48	39	546	558
242	48	46	666	474
243	45	43	536	604
244	51	44	540	508
245	51	44	460	384
246	52	41	486	530
247	47	48	488	504
248	47	42	686	596
249	49	41	712	392
250	48	47	508	518
Average	50	46	692	631
Std. Dev.	4.033572	4.38146	148.05504	131.8222
T- Test	3.54E-22		1.491E-06	
Probability %	100		99.999851	

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE DIVISION
OBJECTIVE DESCRIPTION OF VARIETY
LETTUCE Lactuca sativa

EXHIBIT

NAME OF APPLICANT (S)

PROGENY ADVANCED GENETICS, INC.

FOR OFFICIAL USE ONLY
PVPO NUMBER **9800351**

ADDRESS (Street and No. or R.F.D. No., City, State, and ZIP Code)

1536B MOFFETT STREET
SALINAS, CALIFORNIA 93905

VARIETY NAME

EXPERIMENTAL DESIGNATION

Place numbers in the boxes for the characters which best describe this variety. Measured data should be the mean of an appropriate number (at least 10) of well-spaced plants. Royal Horticultural Society or any recognized color standard may be used to determine plant colors.

The location of the test area is:

Color System Used:

1. PLANT TYPE: (See list of suggested check varieties page 4.)

0 6

- 01-Cutting/Leaf 05=Great Lakes Group
02-Butterhead 06-Vanguard Group
03-Bibb 07=Imperial Group
04=Cos or Romaine 08=Eastern (Ithaca) Group

- 09-Stem
10-Latin
11-OTHER

2. SEED:

2

- 1=White (Silver Gray)
2=Black (Gray Brown)
3=Brown (Amber)

2

- LIGHT DORMANCY
1=Light Required
2=Light Not Required

1

- HEAT DORMANCY
1=Susceptible
2=Not Susceptible

3. COTYLEDON TO FOURTH LEAF STAGE: NOTE: Provide a color photograph or photocopy of the fourth leaf from 20 day old seedling grown under optimal conditions.

3

SHAPE OF COTYLEDONS:

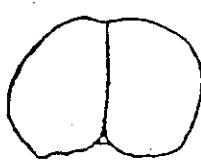
1=Broad

2=Intermediate

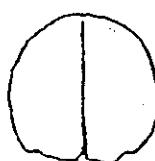
3=Spatulate

4

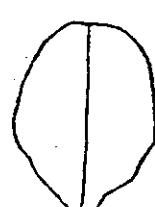
SHAPE OF FOURTH LEAF:



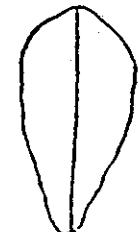
1



2



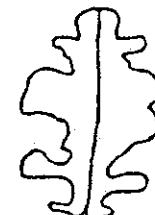
3



4



5



6

1 6

LENGTH/WIDTH INDEX OF FOURTH LEAF: L/W x 10.

3

APICAL MARGIN:

1=Entire

4=Moderately Dentate

7=Lobed

4

BASAL MARGIN:

2=Creanate/Gnawed

5=Coarsely Dentate

8=OTHER (specify)

1

UNDULATION:

1=Flat

2=Slight

3=Medium

4=Marked

3

GREEN COLOR:

1=Yellow Green
2=Light Green

3=Medium Green
4=Dark Green

5=Blue Green
6=Silver Green

7=Gray Green

ANTHOCYANIN:

1

DISTRIBUTION:

1=Absent

3=Spotted
4=Throughout

5=OTHER (specify)

0

CONCENTRATION:

1=Light

2=Moderate

3=Intense

1

ROLLING:

1=Absent

2=Present

1

CUPPING:

1=Uncupped

2=Slight

3=Markedly

1

REFLEXING:

1=None

2=Apical Margin

3=Lateral Margins

4. MATURE LEAVES (observe harvest-mature outer leaves):

NOTE: Provide color photo of harvest-mature leaves which accurately shows color and margin characteristics.

9800351

MARGIN:

<input type="checkbox"/> 2	INCISION DEPTH: <i>(deepest penetration of the margin)</i>	1=Absent/Shallow (Dark Green Boston) 2=Moderate (Vanguard) 3=Deep (Great Lakes 659)
<input type="checkbox"/> 4	INDENTATION: <i>(finest divisions of the margin)</i>	1=Entire (Dark Green Boston) 2=Shallowly Dentate (Great Lakes 65) 3=Deeply Dentate (Great Lakes 659) 5=OTHER (specify)
<input type="checkbox"/> 2	UNDULATION OF THE APICAL MARGIN:	1=Absent/Slight (Dark Green Boston) 2=Moderate (Vanguard) 3=Strong (Great Lakes 659)
<input type="checkbox"/> 4	GREEN COLOR:	1=Very Light Green (Bibb) 2=Light Green (Minetto) 3=Medium Green (Great Lakes) 4=Dark Green (Vanguard) 5=Very Dark Green 6=OTHER
ANTHOCYANIN (grown at or below 10 C):		
<input type="checkbox"/> 1	DISTRIBUTION:	1=Absent 2=Margin Only (Big Boston)
<input checked="" type="checkbox"/> 10	CONCENTRATION:	1=Light (Iceberg) RECEIVED USDA-AMS-PVP0 '98 AUG -3 AM 104
<input type="checkbox"/> 2	SIZE:	1=Small 2=Medium 3=Large
<input type="checkbox"/> 2	GLOSSINESS:	1=Dull (Vanguard) 2=Moderate (Salinas) 3=Glossy (Great Lakes)
<input type="checkbox"/> 2	BLISTERING:	1=Absent/Slight (Salinas) 2=Moderate (Vanguard) 3=Strong (Prize Head)
<input type="checkbox"/>	LEAF THICKNESS:	1=Thin 2=Intermediate 3=Thick
<input type="checkbox"/> 1	TRICHOMES:	1=Absent (smooth) 2=Present (spiny)

5. PLANT (at market stage. Choose a comparison variety appropriate for this type.):

SPREAD OF FRAME LEAVES:

<input type="checkbox"/> 5	cm This Variety	4 9 cm	RAIDER	(specify comparison variety)
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HEAD DIAMETER (market trimmed with single cap leaf):

<input type="checkbox"/> 14	cm This Variety	1 3 cm	RAIDER	(specify comparison variety)
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<input type="checkbox"/> 3	HEAD SHAPE:	1=Flattened 2=Slightly Flattened	3=Spherical 4=Elongate	5=Non-Heading 6=OTHER
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<input type="checkbox"/> 2	HEAD SIZE CLASS:	1=Small	2=Medium	3=Large
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<input type="checkbox"/> 24	HEAD COUNT PER CARTON
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<input type="checkbox"/> 6175	HEAD WEIGHT:	g This Variety	5 3 6 8 g	RAIDER	(specify comparison variety)
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<input type="checkbox"/> 3	HEAD FIRMNESS:	1=Loose 2=Moderate	3=Firm 4=Very Firm
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6. BUTT (bottom of market-trimmed head):

<input type="checkbox"/> 3	SHAPE:	1=Slightly Concave	2=Flat	3=Rounded
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<input type="checkbox"/> 2	MIDRIB:	1=Flattened (Salinas)	2=Moderately Raised	3>Prominently Raised (Great Lakes 659)
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7. CORE (stem of market-trimmed head):

<input type="checkbox"/> 34	mm Diameter at base of head
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<input type="checkbox"/> 401	Ratio of head diameter/core diameter
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<input type="checkbox"/> 31	Core height from base of head to apex:	3 0 mm	RAIDER	(specify comparison variety)
-----------------------------	--	--------	--------	------------------------------

8. BOLTING (Give First Water Date _____):	J:	NOTE: First Water Date is the date seed first receives adequate moisture to germinate. This can and often does equal the planting date.
---	----	---

Number of days from First Water Date to seed stalk emergence (summer conditions):	RAIDER: 72 DAYS
---	-----------------

This Variety	0 6 8	FALLGREEN	(specify comparison variety)
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BOLTING CLASS:	1=Very Slow 2=Slow	3=Medium 4=Rapid	5=Very Rapid
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Height of mature seed stalk:	0 9 7 cm	RAIDER	(specify comparison variety)
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9800351

Spread of Bolter Plant (at widest point):

 5 cm This Variety 4 cm **RAIDER**

(specify comparison variety)

 2

BOLTER LEAVES:

1=Straight

2=Curved

 2

MARGIN:

1=Entire

2=Dentate

 2

COLOR:

1=Light Green

2=Medium Green

3=Dark Green

BOLTER HABIT:

 1

TERMINAL INFLORESCENCE:

1=Absent

2=Present

 1LATERAL SHOOTS:
(above head)

1=Absent

2=Present

 1

BASAL SIDE SHOOTS: 1=Absent

2=Present

9. MATURITY (earliness of harvest-mature head formation):

NOTE: Complete this section for at least one season.

SEASON	Applc. 1/ # of days	Check 1/ # of days	CHECK VARIETY 2/
Spring	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
Summer	<input type="checkbox"/> 65	<input type="checkbox"/> 62	Raider
Fall	<input type="checkbox"/> 77	<input type="checkbox"/> 73	Raider
Winter	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	

Give planting date(s), and location(s):

Spring

Summer

SALINAS VALLEY OF CALIFORNIA 4/22/98**SALINAS VALLEY OF CALIFORNIA 6/01**

Fall

YUMA, ARIZONA 9/17/95**YUMA, ARIZONA 9/12/95**

Winter

1/ First water date to harvest.

2/ Fill in check variety name on the appropriate line.

10. ADAPTATION:

PRIMARY REGIONS OF ADAPTION (tested and proven adapted):

0=Not tested

1=Not Adapted

2=Adapted

 2

Southwest (Calif., Ariz. desert)

 2 West Coast 0 Northeast 0

Northcentral

 0 Southeast OTHER

SEASON:

 0 Spring (area _____) 2 Fall (area **YUMA, ARIZONA** _____) 2 Summer (area **SALINAS VALLEY OF** Winter (area _____)**CALIFORNIA** 0

GREENHOUSE:

0=Not tested

1=Not Adapted

2=Adapted

SOIL TYPE:

1=Mineral

2=Organic

3=Both

11. DISEASES AND STRESS REACTIONS. (0=Not tested; 1=Susceptible; 2=Intermediate; 3=Resistant; 4=Highly resistant; 5=Tolerant):

VIRUS

- 0 Big Vein
 0 Lettuce Mosaic
 0 Cucumber Mosaic
 0 Broad Bean Wilt
 0 Turnip Mosaic
 0 Beet Western Yellows
 0 Lett. Infectious Yellows
 Other Virus _____

FUNGAL/BACTERIAL

- 0 Corky Root Rot (Pythium Root Rot)
 0 Downy Mildew (Races _____)
 0 Powdery Mildew
 0 Sclerotinia Rot
 0 Bacterial Soft Rot (Pseudomonas spp. & others)
 0 Botrytis (Gray Mold)
 OTHER _____

9800351

RECEIVED
USDA-AMS-PVPQINSECTS

- 0 Cabbage Loopers
 0 Root Aphids
 0 Green Peach Aphid
 0 Other Insect _____

'98 AUG -3 AM 10:04

PHYSIOLOGICAL/STRESS

- 3 Tipburn
 0 Salt
 3 Heat
 0 Brown Rib (Rib Discoloration, Rib Blight)
 0 Drought
 OTHER _____
 0 Cold

POST HARVEST

- 0 Pink Rib
 0 Russet Spotting
 0 Rusty Brown Discoloration

- 0 Internal Rib Necrosis (Blackheart, Gray Rib, Gray Streak)
 0 Brown Stain

12. BIOCHEMICAL OR ELECTROPHORETIC MARKERS:

13. COMMENTS:

SUGGESTED CHECK VARIETIESTYPE

- 1) CUTTING/LEAF
- 2) BUTTERHEAD
- 3) BIBB
- 4) COS, OR ROMAINE
- 5) GREAT LAKES GROUP
- 6) VANGUARD GROUP
- 7) IMPERIAL GROUP
- 8) EASTERN GROUP
- 9) STEM
- 10) LATIN

CHECK VARIETY

- SALAD BOWL
DARK GREEN BOSTON
BIBB
PARRIS ISLAND
GREAT LAKES 659-700
VANGUARD
VIVA
ITHACA
CELTUCE
MATCHLESS

EXHIBIT CADDITIONAL INFORMATION**8. BOLTING (CONT.)**

Bolter Leaves: (1) Straight (2) Curved

(2) Raider

Margin: (1) Entire (2) Dentate

(2) Raider

Color: (1) Light Green (2) Medium Green (3) Dark Green

(2) Raider

Bolter Habit:

Terminal Inflorescence: (1) Absent (2) Present

(1) Raider

Lateral Shoots: (1) Absent (2) Present
(above heads)

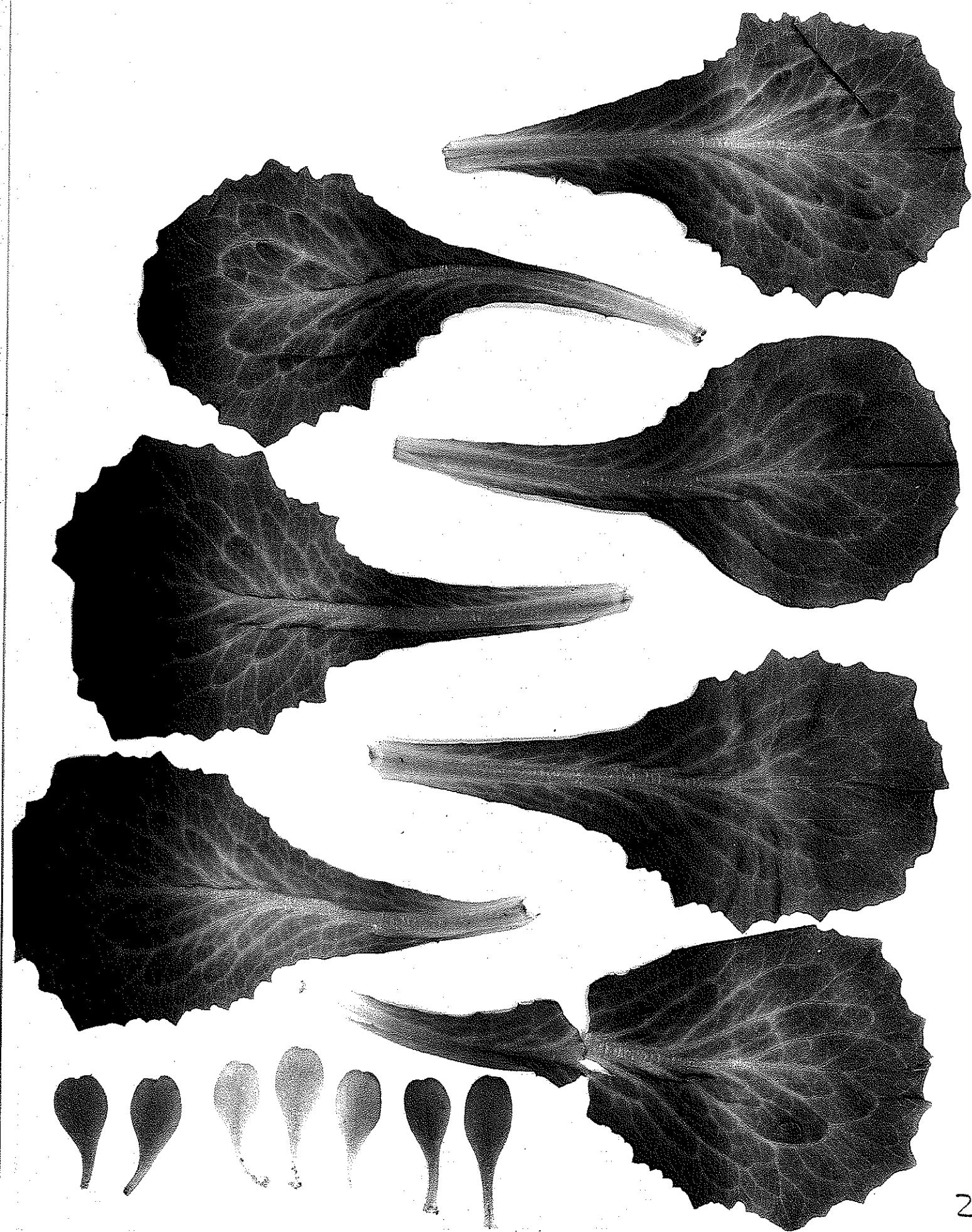
(1) Raider

Basal Side Shoots: (1) Absent (2) Present

(1) Raider

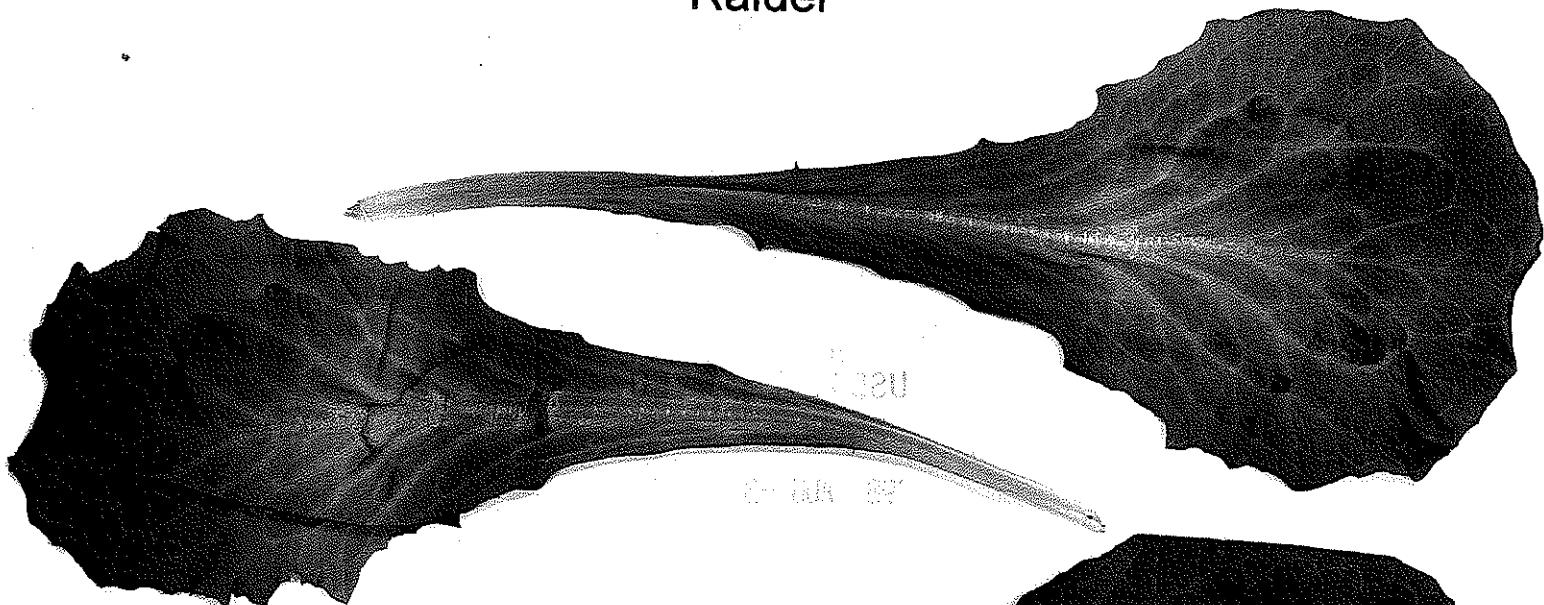
9800351

CRUSADER

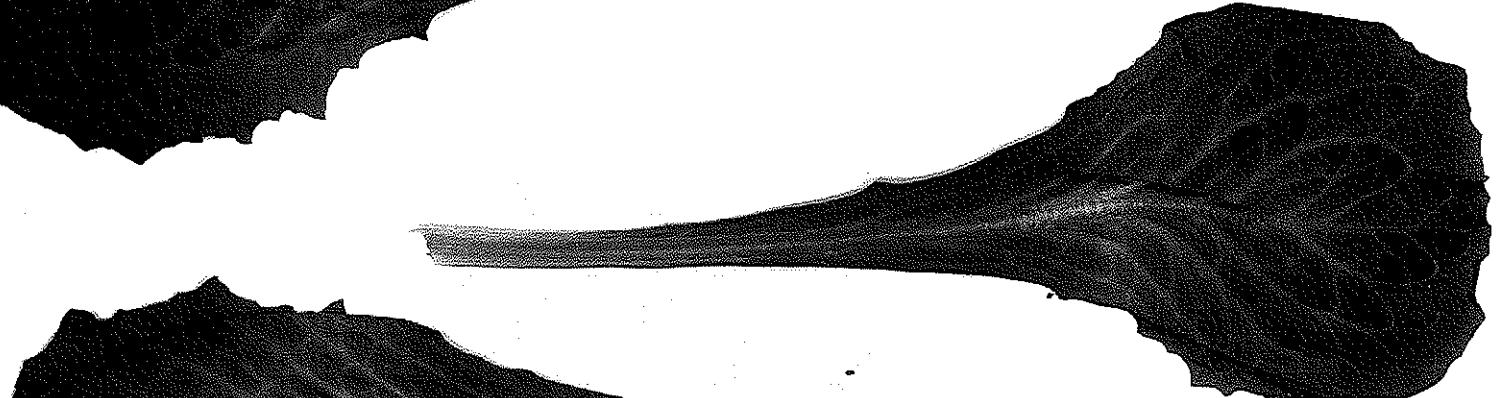
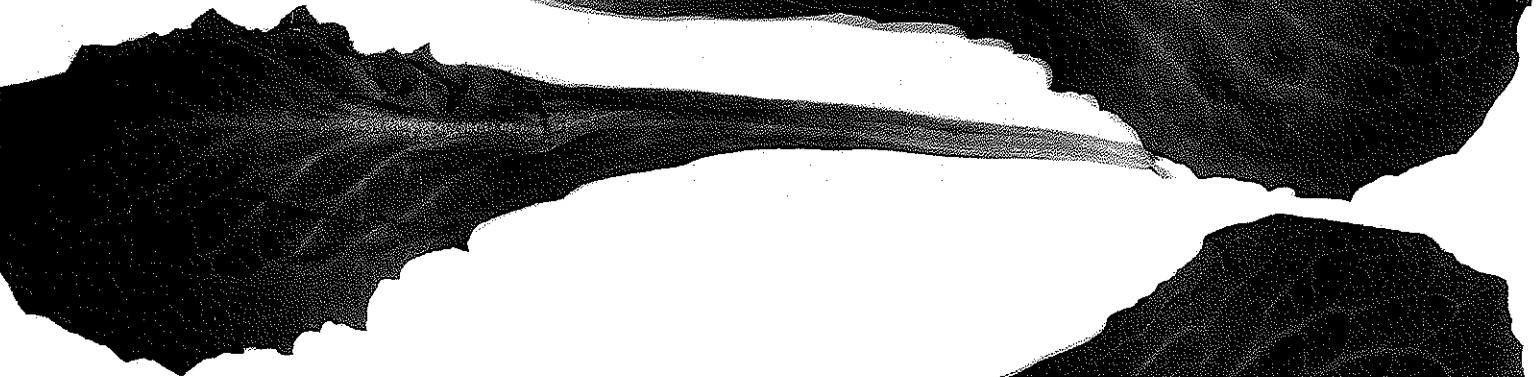
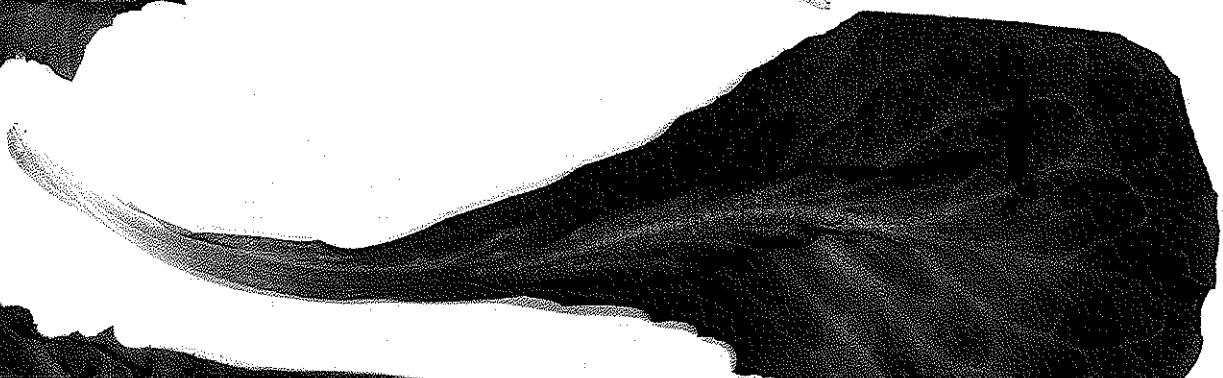


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Raider

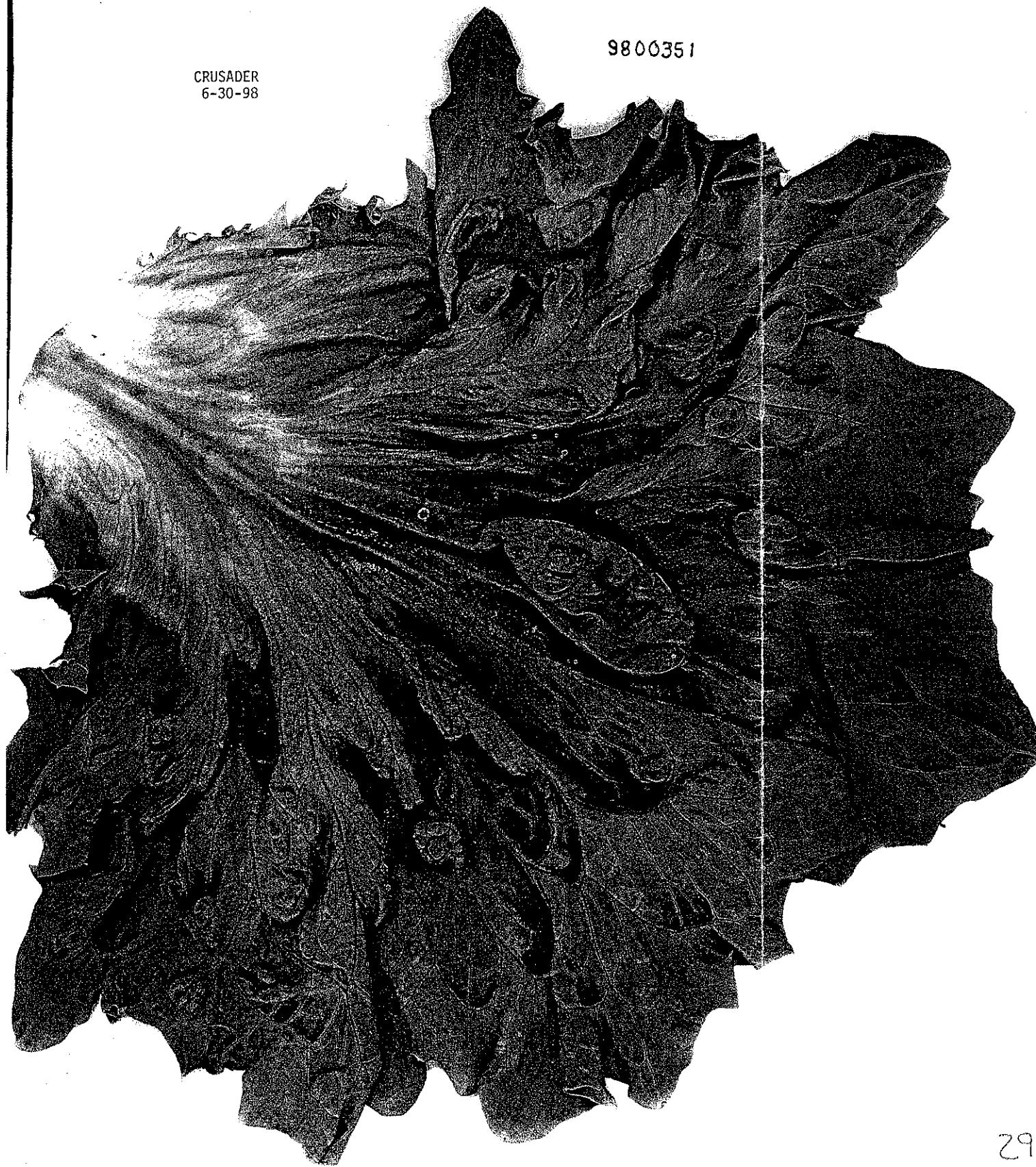


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Raider

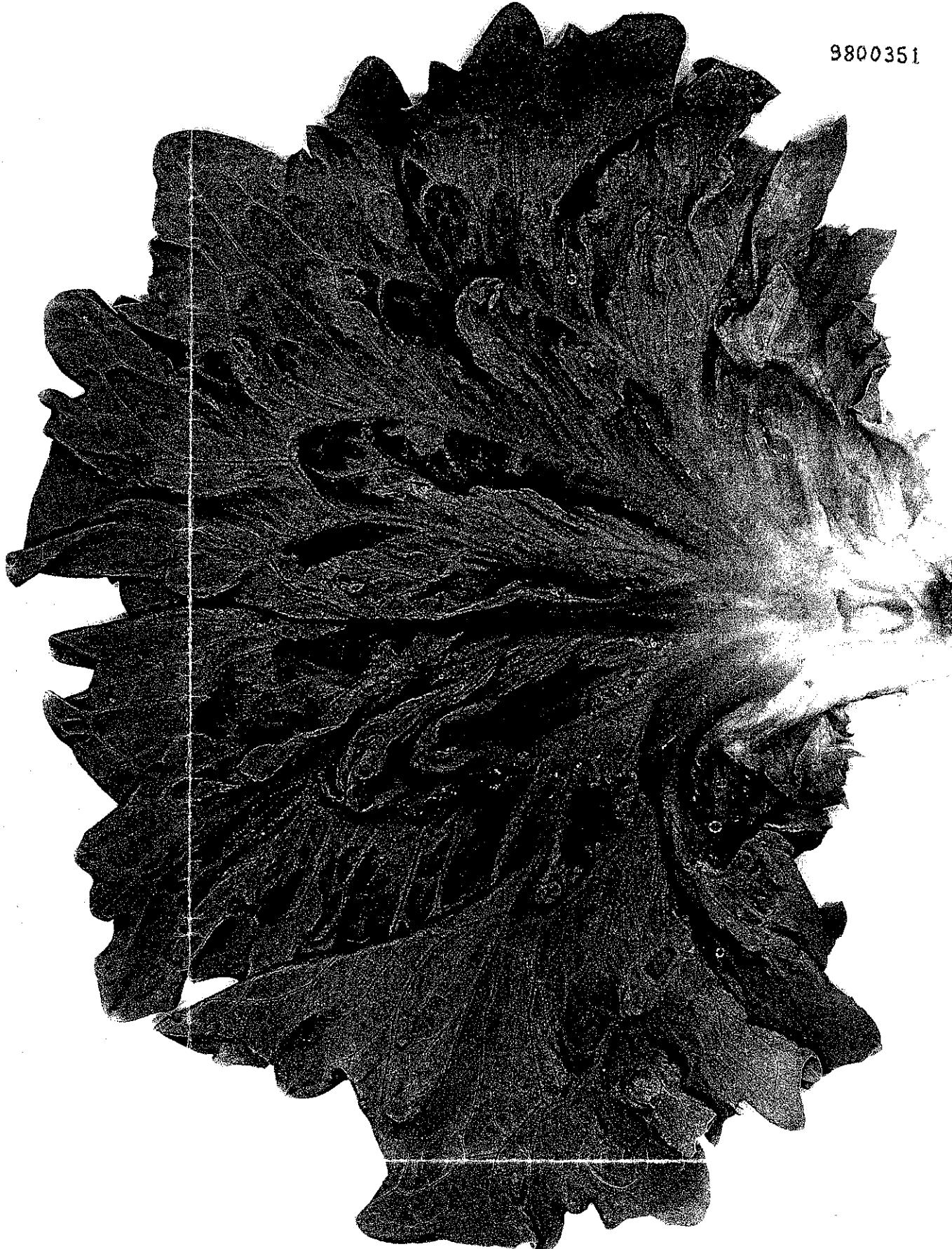


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CRUSADER
6-30-98



9800351



6/30/98
RAIDER

30

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EXHIBIT D

Additional Description of the Variety

Crusader is a dark green, large framed, heat tolerant iceberg developed for heat intense conditions such as the fall plantings of Yuma Az, and Huron Ca.

30
4020

30 30 30 30 30



Crusader also resembles its male parent Fall Green. Crusader is distinguished from Fall Green as it consistently demonstrates larger size as indicated by 5 quantitative traits. In repeated trials, Crusader has proven to have a longer core length, a larger core diameter, a larger head diameter, a larger frame diameter, and a heavier head weight. This data is supported statistically, at a minimum 95% confidence level in 4 repeated trials.

Crusader is distinct and unique from the variety Fall Green, as indicated by the 4 heading measurements to follow.

1. Crusader has a longer core length than the variety Fall Green. This data is statistically significant in 4 repeated trials, with a minimum confidence level of 95.4%.
2. Crusader has a larger core diameter than the variety Fall Green. This data is statistically significant in 4 repeated trials, with a minimum confidence level of 99.9%.
3. Crusader has a larger head diameter than the variety Fall Green. This data is statistically significant in 3 of the 4 repeated trials, with the following confidence levels: 99.9%, 100%, 99.9%, 6.77%. By pooling the data we see that over all, this trait is a statistically significant difference at a 99.9% confidence level.
4. Crusader has a larger frame diameter than the variety Fall Green. This data is significantly significant in 4 repeated trials with a minimum confidence level of 99.6%.
5. Crusader produces a heavier head than Fall Green. This weight is representative of a harvested head of lettuce trimmed to market specs. This data is statistically significant in 4 repeated trials, with a minimum confidence level of 96.2 %.

PVP DATA:

Trial map #: RSJV98090
 Wet Date: 8/27/98
 Date evald: 10/30/98

Location: Huron
 Grower: Royal Packing

Ranch/Lc Lowe 3

Commercial variety: Raider

Sample #	Core length (cm)			Core width (cm)			Head width (cm)			Head length (cm)			Avg Head Diameter (cm)			Frame diam (cm)			Head Weight (g)			
	Crusader	Fallgreen	Crusader	Fallgreen	Crusader	Fallgreen	Crusader	Fallgreen	Crusader	Fallgreen	Crusader	Fallgreen	Crusader	Fallgreen	Crusader	Fallgreen	Crusader	Fallgreen	Crusader	Fallgreen		
1	2.4	2.6	3.5	3.6	14.5	15.9	13.4	15.05	14.65	6.3	5.6	4.6	4.6	530	530	532	532	530	530	530		
2	2.6	2.1	3.6	3.3	15.7	14.9	14.2	13.3	14.95	5.8	6.7	4.8	4.7	530	530	564	564	530	530	530		
3	2.4	2.4	3.5	3.0	14.5	13.2	14.1	12.2	14.3	6.0	5.3	4.9	4.9	648	648	650	650	648	648	648		
4	3.1	2.4	3.6	3.1	15.7	14.6	14.1	13.8	14.9	14.2	4.8	5.9	5.2	5.2	672	672	464	464	672	672	672	
5	3.3	2.4	3.4	3.2	16.2	15.6	14.8	14.9	15.5	15.25	4.7	6.4	5.2	4.4	654	654	650	650	654	654	650	
6	2.9	2.1	3.5	3.1	15.7	12.0	15.8	12.7	15.75	12.35	5.4	5.9	5.1	4.8	614	614	672	672	614	614	672	
7	3	2.1	3.4	3.0	18.1	13.9	15.2	12.7	16.65	13.3	5.6	6.3	5.0	4.5	460	460	378	378	460	460	378	
8	3.4	2.2	3.5	3.2	16.7	15.2	14.6	12.3	15.65	13.75	4.6	6.3	4.9	4.8	616	616	596	596	616	616	596	
9	2.9	2.6	3.4	3.1	16.5	14.3	15.2	14.6	15.85	14.45	5.5	5.6	4.6	4.6	578	578	494	494	578	578	494	
10	3.3	2.0	3.5	3.0	15.4	15.7	14.9	14.1	15.15	14.9	4.6	7.5	5.2	4.2	680	680	448	448	680	680	448	
11	2.9	2.6	3.2	2.8	17.1	16.4	16.7	14.9	16.9	15.65	5.8	6.0	4.9	4.4	552	552	562	562	552	552	562	
12	2.5	2.8	3.2	2.6	15.6	13.5	14.7	14.1	15.15	13.8	6.1	4.9	5.1	4.5	524	524	606	606	524	524	606	
13	3.4	2.2	3.7	3.0	16.4	13.2	15.2	13.6	15.8	13.4	4.6	6.1	5.3	4.7	610	610	452	452	610	610	452	
14	2.8	2.0	3.4	2.9	16.4	14.9	15.0	13.3	15.7	14.1	5.6	7.1	4.8	4.8	802	802	734	734	802	802	734	
15	2.9	2.6	3.5	3.1	17.6	13.5	14.8	12.6	16.2	13.05	5.6	5.0	5.2	4.7	666	666	736	736	666	666	736	
16	2.9	2.6	3.2	2.6	14.7	13.3	14.2	12.9	14.45	13.1	5.0	5.0	4.6	4.5	524	524	530	530	524	524	530	
17	2.8	3.2	3.6	3.4	14.2	12.5	14.0	13.4	14.1	12.95	5.0	4.0	4.9	4.4	590	590	488	488	590	590	488	
18	3.1	2.5	3.2	2.6	14.6	13.6	13.9	14.4	14.25	14	4.6	5.6	4.9	4.8	672	672	430	430	672	672	430	
19	2.5	2.0	3.9	3.9	16.0	14.1	15.4	14.7	15.7	14.4	6.3	7.2	5.0	4.2	620	620	796	796	620	620	796	
20	2.4	2.8	3.3	3.5	15.9	16.1	14.1	15.1	15	15.6	6.3	5.6	4.8	4.5	540	540	690	690	540	540	690	
21	2.9	2.2	3.6	3.0	16.5	13.4	16.0	13.9	16.25	13.65	5.6	6.2	4.7	4.4	602	602	418	418	602	602	418	
22	3.4	2.6	3.4	3.4	18.2	13.5	16.4	13.2	17.3	13.35	5.1	5.1	4.9	4.3	736	736	484	484	736	736	484	
23	2.4	2.3	3.2	3.3	14.3	13.3	14.3	13.6	14.3	13.45	6.0	5.8	4.8	4.6	686	686	536	536	686	686	536	
24	2.9	2.4	3.5	3.6	16.4	13.7	15.1	13.1	15.75	13.4	5.4	5.6	4.9	4.4	544	544	598	598	544	544	598	
25	2.5	2.3	3.5	3.4	14.9	13.3	13.5	13.7	14.2	13.5	5.7	5.9	5.0	4.5	714	714	482	482	714	714	482	
26	3.2	2.6	3.3	3.9	14.6	12.4	15.4	12.6	15	12.5	4.7	4.8	4.8	4.6	608	608	444	444	608	608	444	
27	2.5	2.3	3.4	3.4	15.4	13.1	14.1	13.2	14.75	13.15	5.9	5.7	4.7	4.5	772	772	546.0	546.0	772	772	546.0	
28	2.5	2.1	3.2	3.1	14.9	14.3	14.4	13.9	14.65	14.1	5.9	6.7	4.9	4.8	610	610	770	770	610	610	770	
29	3.2	3.2	3.3	3.2	16.5	13.3	14.3	13.1	15.4	13.2	4.8	4.1	5.1	4.7	662	662	532.0	532.0	662	662	532.0	
30	2.4	3.6	3.5	3.4	16.2	14.7	15.2	15.7	14.95	6.5	4.2	5.1	4.6	662	662	604	604	662	662	604		
Average	2.8	2.5	3.4	3.2	15.8	14.0	14.8	13.6	15.3	13.8	5.5	5.7	4.93	4.58	622.6	622.6	566.5	566.5	622.6	622.6	566.5	
Stan dev	0.243143	0.381105	0.168336	0.331506	1.08174	1.1371	0.7085	0.84283366	0.8182955	0.8672671	0.591174006	0.83850852	1.952481	2.12376	78.7140613	111.70633						
T test	0.000118	0.000097	4.7E-08	2.3E-07	3.641E-09	0.139843077	1.023E-08	0.02844608	0.02844608	0.02844608	0.02844608	97.1533917	97.1533917	97.1533917	97.1533917							
Probability %	99.98821	99.93028	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	

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Trial map: YMFD98005
 Wet Date: 12/4/98
 Date evald 3/13/99

PVP DATA:
Comparison of Head Characteristics

Location: Dome Valley Ranch: Moore
 Grower: Nakasawa T.A. Lot: 27

Commercial variety:
 Desert Spring

Sample #	Core length (cm)	Core diam. (cm)	Head diam. (cm)	Head length (cm)	Avg Head Diam:Core	Frame diam (cm)	Head wt. (g)
	Crusader	Fallgreen	Crusader	Fallgreen	Crusader	Fallgreen	Crusader
1	2.5	2.7	3.3	2.7	14.9	14.0	12.1
2	2.5	2.5	3.1	3.0	14.4	13.2	12.6
3	2.4	2.6	3.6	2.6	14.0	13.4	13.8
4	2.0	1.9	3.4	3.0	14.1	14.2	12.2
5	2.4	2.5	3.0	3.3	14.4	15.4	13.1
6	2.3	1.8	3.3	3.1	15.1	14.4	13.6
7	1.9	1.8	3.9	3.2	13.8	14.2	12.7
8	2.9	1.9	3.8	3.0	15.1	14.1	12.4
9	2.2	1.8	3.7	3.3	13.9	12.0	13.4
10	2.7	2.6	3.7	3.0	14.3	13.1	13.4
11	1.9	2.7	3.5	3.4	14.0	14.6	12.5
12	1.9	2.0	3.2	3.0	15.2	14.1	12.0
13	2.3	2.0	3.5	3.3	14.1	13.2	12.5
14	1.9	2.0	3.2	3.1	13.2	14.1	11.6
15	2.1	2.5	3.0	3.5	14.6	14.2	12.5
16	3.1	2.4	3.5	3.0	13.9	14.9	13.0
17	2.1	2.1	3.4	2.7	13.7	14.4	12.6
18	2.5	2.2	3.1	3.1	13.6	13.6	14.0
19	2.5	2.1	3.6	3.1	13.2	13.4	12.4
20	2.1	2.1	3.5	3.2	14.0	14.3	12.1
21	2.0	2.5	3.5	3.4	13.1	14.1	11.3
22	2.8	1.9	3.4	3.0	14.1	12.7	12.2
23	2.9	1.9	3.2	3.1	14.6	13.9	14.2
24	2.6	1.9	3.8	3.1	14.4	13.1	13.9
25	2.4	1.9	3.5	3.0	13.1	14.2	12.3
26	2.0	1.8	3.1	3.3	14.2	12.3	12.1
27	2.6	2.7	3.3	3.1	14.9	15.4	12.9
28	2.6	2.4	3.4	3.2	14.5	13.8	13.2
29	2.4	2.3	3.6	3.1	14.4	10.9	13.3
30	2.0	1.8	3.2	3.1	13.6	12.4	13.0
Average	2.4	2.2	3.4	3.1	14.1	13.7	13.0
Stan dev	0.337077	0.321294	0.242615	0.207177	0.586476	0.981343	0.896385
T test	0.046043	1.39E-06			0.045488	0.64842	0.154027
	95.39574	99.99986	95.45125	35.15798	84.59726	94.38104	99.99982
							97.20683

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W

36

Trial map: YM/PD98007
 Wet Date: 12/8/98
 Date eval: 3/25/99

Location: Texas Hill
 Ranch: 21B-2
 Grower: BFP/Dole
 Lot:

Commercial variety:
 Danenberg 86

PVP DATA:

Comparison of Head Characteristics

Sample #	Core length (cm)			Core diam. (cm)			Head diam. (cm)			Head length (cm)			Avg Head Diam:Core			Frame diam (cm)			Head wt. (g)		
	Crusader	Fallgreen	Crusader	Fallgreen	Crusader	Fallgreen	Crusader	Fallgreen	Crusader	Fallgreen	Crusader	Fallgreen	Crusader	Fallgreen	Crusader	Fallgreen	Crusader	Fallgreen	Crusader	Fallgreen	
1	2.6	2.5	3.2	3.2	15.5	14.4	13.9	15.4	14.7	14.9	5.7	6.0	4.8	4.7	774	774	684	684			
2	2.3	2.6	3.6	3.1	14.7	15.4	14.4	16.5	14.6	16.0	6.3	6.1	4.9	5.4	768	768	706	706			
3	2.6	2.0	3.8	3.3	14.2	13.3	14.4	14.1	14.3	13.7	5.5	6.9	4.7	4.8	848	848	728	728			
4	3.6	2.9	3.5	3.0	13.9	14.9	15.5	15.2	14.7	15.1	4.1	5.2	5.0	4.7	734	734	700	700			
5	2.3	3.2	3.0	14.2	14.8	14.8	14.2	14.5	14.5	14.5	6.3	5.0	4.9	4.7	892	892	600	600			
6	2.8	2.0	3.6	3.1	14.5	13.3	15.0	15.4	14.8	14.4	5.3	4.5	4.6	4.3	848	848	720	720			
7	2.0	2.1	3.4	3.0	13.0	13.9	13.2	14.2	14.6	13.1	14.3	6.6	7.1	4.7	4.4	700	700	582	582		
8	2.8	2.1	3.5	3.4	14.0	15.4	14.6	14.5	14.3	15.0	5.1	7.1	4.9	4.6	624	624	894	894			
9	2.9	1.8	3.2	3.3	14.1	13.3	16.1	14.9	15.1	14.1	5.2	6.7	4.7	4.7	740	740	794	794			
10	2.2	2.6	3.2	3.8	13.6	16.4	15.1	15.4	14.4	15.9	6.5	8.8	4.7	4.5	964	964	772	772			
11	2.7	2.6	3.7	3.0	13.4	13.5	14.2	15.1	13.8	14.3	5.1	5.5	4.9	4.2	902	902	720	720			
12	3.5	2.5	3.7	3.4	15.8	14.9	16.4	14.4	16.1	14.7	4.6	5.6	4.6	4.2	1016	1016	542	542			
13	3.2	2.1	3.6	3.0	14.4	15.0	14.5	15.0	14.5	15.0	4.5	6.0	5.0	4.4	902	902	770	770			
14	3.1		3.5		14.5		14.2		14.4		4.6		4.6		860	860					
15	2.7		3.4		15.9		14.5		15.2		5.6		4.6		824	824					
16	3.2		3.4		14.2		15.1		14.7		4.6		4.9		874	874					
17	2.6		3.6		13.6		14.9		14.3		5.5		4.7		820	820					
18	2.0		3.8		14.0		14.4		14.2		7.1		4.5		610	610					
19	3.4		3.5		16.4		17.0		16.7		4.9		4.9		624	624					
20	3.6		3.6		15.4		15.4		15.4		4.3		5.1		706	706					
21	2.7		3.8		15.5		15.5		15.5		5.7		5.0		734	734					
22	3.1		3.9		13.0		15.1		14.1		4.5		5.1		670	670					
23	3.0		3.2		16.1		15.4		15.8		5.3		5.0		868	868					
24	3.2		3.6		13.4		15.0		14.2		4.4		4.7		702	702					
25	2.9		3.5		14.9		15.3		15.1		5.2		4.9		916	916					
26	3.1		3.6		15.4		14.4		14.9		4.8		4.7		780	780					
27	3.3		3.4		14.1		16.9		16.5		4.7		4.9		852	852					
28	3.5		3.6		14.5		16.2		15.4		4.4		4.6		684	684					
29	3.0		3.2		13.5		14.6		14.1		4.7		5.1		660	660					
30	2.1		3.1		14.5		14.5		14.5		6.9		5.2		662	662					
Average	2.9		3.5		14.5		15.0		14.7		5.3		6.2		48.4	48.4					
Stand dev	0.468551	0.405886	0.214127	0.238048	0.921368	0.982344	0.645686	0.730063	0.657379	0.818006	1.141533	1.809617	3.184498	3.032871	94.1431	94.1431					
T test	0.002522	0.000232		0.932304		0.882257		0.979935		0.004262		0.003988		0.032871							
	99.74775	99.97679		6.769604		11.77431		2.20049		99.57385		99.60018		96.71289							

9800351

9800351

POOLED DATA FROM 4 TRIALS

Sample	Head Diameter (cm)	
	Crusader	Fallgreen
1	16	14.2
2	15.1	13.5
3	15.9	14.8
4	13.9	13.2
5	14.3	12.4
6	13.9	15.9
7	15.2	13.2
8	14.7	13.1
9	13.1	13.0
10	14.5	13.1
11	14.7	14.4
12	13.9	14.0
13	15.1	13.6
14	12.5	13.4
15	15.7	13.1
16	15.5	15.4
17	16.5	13.2
18	14.5	12.5
19	15.9	13.4
20	14.5	10.9
21	14.4	13.9
22	16.2	13.3
23	14.9	12.6
24	13.4	12.2
25	14.5	13.4
26	14.9	14.6
27	12.9	11.5
28	14.0	12.9
29	14.6	12.5
30	16.5	14.0
31	14.5	15.9
32	15.7	14.9
33	14.5	13.2
34	15.7	14.6
35	16.2	15.6
36	15.7	12.0
37	18.1	13.9
38	16.7	15.2
39	16.5	14.3
40	15.4	15.7
41	17.1	16.4
42	15.6	13.5
43	16.4	13.2
44	16.4	14.9
45	17.6	13.5
46	14.7	13.3
47	14.2	12.5
48	14.6	13.6
49	16.0	14.1
50	15.9	16.1
51	16.5	13.4
52	18.2	13.5

9800351

Sample	Head Diameter (cm)	
	Crusader	Fallgreen
53	14.3	13.3
54	16.4	13.7
55	14.9	13.3
56	14.6	12.4
57	15.4	13.1
58	14.9	14.3
59	16.5	13.3
60	16.2	14.7
61	14.9	14.0
62	14.4	13.2
63	14.0	13.4
64	14.1	14.2
65	14.4	15.4
66	15.1	14.4
67	13.8	14.2
68	15.1	14.1
69	13.9	12.0
70	14.3	13.1
71	14.0	14.6
72	15.2	14.1
73	14.1	13.2
74	13.2	14.1
75	14.6	14.2
76	13.9	14.9
77	13.7	14.4
78	13.6	13.6
79	13.2	13.4
80	14.0	14.3
81	13.1	14.1
82	14.1	12.7
83	14.6	13.9
84	14.4	13.1
85	13.1	14.2
86	14.2	12.3
87	14.9	15.4
88	14.5	13.8
89	14.4	10.9
90	13.6	12.4
91	15.5	14.4
92	14.7	15.4
93	14.2	13.3
94	13.9	14.9
95	14.2	14.8
96	14.5	13.3
97	13.0	13.9
98	14.0	15.4
99	14.1	13.3
100	13.6	16.4
101	13.4	13.5
102	15.8	14.9
103	14.4	15.0
104	14.5	
105	15.9	
106	14.2	
107	13.6	

9800351

Sample	Head Diameter (cm)	
	Crusader	Fallgreen
108	14.0	
109	16.4	
110	15.4	
111	15.5	
112	13.0	
113	16.1	
114	13.4	
115	14.9	
116	15.4	
117	14.1	
118	14.5	
119	13.5	
120	14.5	
Average	14.8	13.8
Std. Dev.	1.116376379	1.0958638
T- Test	2.62816E-10	
Probability %	99.99999997	

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE*The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a) and the Paperwork Reduction Act (PRA) of 1995.***EXHIBIT E
STATEMENT OF THE BASIS OF OWNERSHIP***Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).*

1. NAME OF APPLICANT(S) PROGENY ADVANCED GENETICS, INC.	2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER PX 544	3. VARIETY NAME CRUSADER
4. ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP, and Country) 1536B MOFFETT STREET SALINAS, CALIFORNIA 93905	5. TELEPHONE (include area code) 831-751-6030	6. FAX (include area code) 831-751-6032
	7. PVPO NUMBER 9800351	

8. Does the applicant own all rights to the variety? Mark an "X" in appropriate block. If no, please explain.

 YES NO9. Is the applicant (individual or company) a U.S. national or U.S. based company?
If no, give name of country YES NO

10. Is the applicant the original owner?

 YES NO *If no, please answer one of the following:*

a. If original rights to variety were owned by individual(s), is (are) the original owner(s) a U.S. national(s)?

 YES NO *If no, give name of country*

b. If original rights to variety were owned by a company(ies), is(are) the original owner(s) a U.S. based company?

 YES NO *If no, give name of country*

11. Additional explanation on ownership (if needed, use reverse for extra space):

PLEASE NOTE:

Plant variety protection can be afforded only to owners (not licensees) who meet one of the following criteria:

1. If the rights to the variety are owned by the original breeder, that person must be a U.S. national, national of a UPOV member country, or national of a country which affords similar protection to nationals of the U.S. for the same genus and species.
2. If the rights to the variety are owned by the company which employed the original breeder(s), the company must be U.S. based, owned by nationals of a UPOV member country, or owned by nationals of a country which affords similar protection to nationals of the U.S. for the same genus and species.
3. If the applicant is an owner who is not the original owner, both the original owner and the applicant must meet one of the above criteria.

The original breeder/owner may be the individual or company who directed final breeding. See Section 41(a)(2) of the Plant Variety Protection Act for definition.

According to the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0581-0055. The time required to complete this information collection is estimated to average 10 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

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